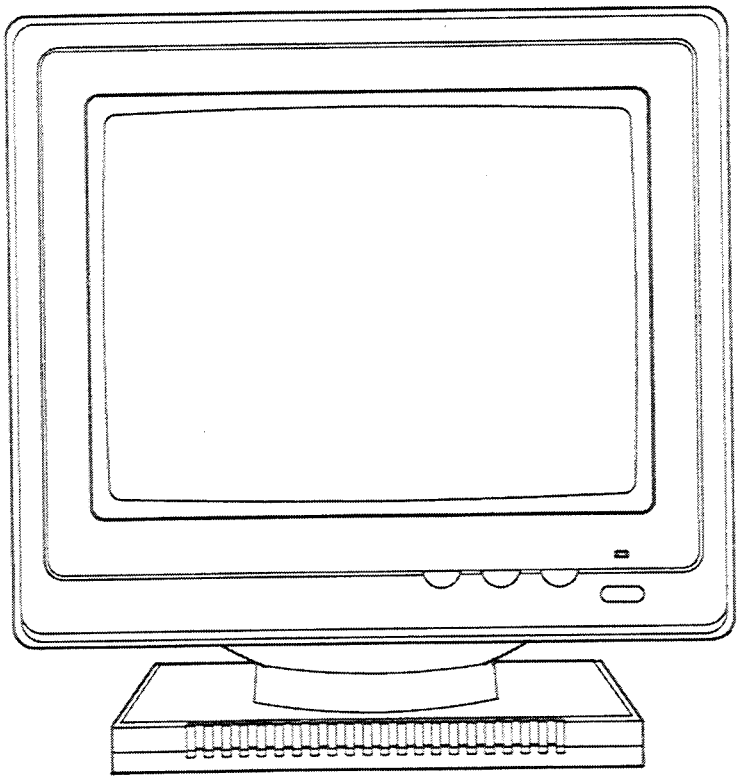
CTX

SERVICE MANUAL

CMS-3435/36



CHUNTEX ELECTRONIC CO.,LTD.

CTX CHUNTEX

SERVICE MANUAL

RD

NO. SM-0030

CMS-3435/36

CAUTION: Before servicing this chassis, it is important that the service technician should read the "Safety Precautions" and "Product Safety Notice" in this Service Manual.

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SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

HIGH RESOLUTION MULTISCAN COLOR MONITOR

March 1990. EDITION 1.0

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis or picture tube.

The following precautions should be observed.

1. Do not install, remove, or handle the picture tube in any manner unless shatterproof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling.
2. When replacing a chassis in the monitor, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment shields, and isolation resistor-capacitor, etc.
3. When service is required, observe the original lead dress. Extra precaution should be taken to assure correct lead dress in the high voltage circuitry area.
4. Always use the manufacturer's replacement components. Especially critical components as indicated on the Replacement parts list should not be replaced by other manufacturer's. Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
5. Before returning a serviced monitor to the customer, the service technician must throughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the monitor by the manufacturer has become defective, or inadvertently defeated during servicing. Therefore, the following checks should be performed for continued protection of the customer and service technician.

High Voltage

This monitor is provided with a high voltage hold down circuit for clearly indicating that voltage has increased in excess of a predetermined value. Comply with all notes described in this Service Manual regarding this hold down circuit when servicing, so that this hold down circuit may function correctly.

Service Warning

With minimum Brightness and Contrast the operating high voltage in this display is lower than 25KV.

If any component having influence on the high voltage is replaced, confirm that the high voltage with minimum Brightness and Contrast is lower than 25 KV. To measure high voltage use a high impedance high-voltage meter.(SENSITIVE RESEARCH Model: ESH or Equivalent) Connect (-) to chassis earth and (+) to the CRT anode button. (See the following connection diagram Fig. 1.)

NOTE:

1) Turn power switch off without fail before making the connection to the Anode button.
2) Before turn power switch ON, confirm the AC line voltage, set the "Voltage Selector".

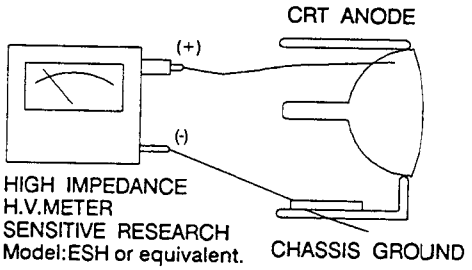


Fig. 1

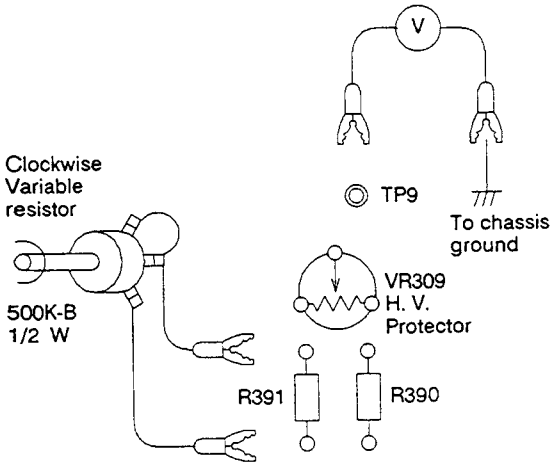
X-radiation

TUBE: The primary source of X-radiation in this monitor is the picture tube. The tube utilized in this chassis is specially constructed to limit X-radiation emissions. For continued X-radiation protection, the replacement tube must be the same type as the original, manufacturer approved type. When troubleshooting and making test measurements in a monitor with a problem of excessive high voltage, avoid being unnecessarily close to the picture tube and the high voltage components. Do not operate the chassis longer than is necessary to locate the cause of excessive voltage.

CHECK OF HIGH VOLTAGE HOLD DOWN CIRCUIT

Checking of the high Voltage hold down circuit operation.

1. Turn the switch of the unit OFF.
2. Set Brightness, Contrast controls to max.
3. Connect a DC Voltmeter and an adjustment jig as shown in Fig. 2.
4. Set the adjustment VR to fully counterclockwise.
5. Turn the switch of the unit ON and gradually rotate the adjustment VR counterclockwise.
6. Check that a reading of DC voltmeter is less than 9.4V ± 0.5V when picture disappears.



Main Board Assembly

Fig. 2

7. Turn the switch of the unit OFF immediately after checking that the picture disappears.
8. Remove the adjusting jig and the DC voltmeter.

Note: Reading of 9.4V is approximately equivalent to 28 KV of CRT Anode High Voltage.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the color monitor units have special safety related characteristics.

These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with "!" on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the manufacturer recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, X-radiation, or other hazards.

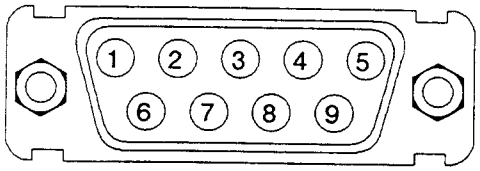
Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult this Service Manual.

FEATURES OF CMS-3435/36

Multiscan, model CMS-3435/36, from Chuntex is a high resolution color monitor that automatically adjusts to graphics board scanning frequencies from 15.5KHz to 38KHz. Multiscan gives IBM PC, PC / XT, PC / AT, PS / 2 and PC compatibles users crisp text and vivid color graphics displays when used with any of the IBM graphics adapters (the CGA, EGA, MCGA, VGA, or 3514A). Multiscan can also be used with other IBM compatible graphics adapters to provide IBM users with the widest range of color monitor compatibility and capability available in the market place.

- CMS-3435/36 automatically scans all frequencies between 15.5KHz and 38KHz and is compatible with the IBM PC, PC / XT, PC / AT, PS / 2 and look-alikes.
- CMS-3435/36 uses 14 inch fine pitch (0.29mm or 0.28mm) non-glare CRT and has a maximum horizontal resolution of 1024 dots and a maximum vertical resolution of 768 lines for superior clarity of display.
- CMS-3435/36 is compatible with IBM CGA, EGA, MCGA, VGA, 8514A graphic adapters and non-IBM Boards supporting extended display modes such as 800 x 600, 132 columns etc. This wide compatibility makes it possible to upgrade boards and software without purchasing a new monitor.
- CMS-3435/36 offers both TTL and ANALOG signal inputs, and in the ANALOG mode can display an unlimited palette of colors depending on the graphics board and software being used. Features a TEXT SWITCH with a choice of four colors (red, blue, green, amber) displaying word processing, spread sheets, data-bases or other software in crisp alphanumeric text on a dark-bulb black background.
- CMS-3435/36 is equipped with vertical auto sizing circuit. The circuit works according to horizontal frequency and sync polarization of IBM CGA, EGA and VGA convention. This function can be made inactive by turning off the Auto Switch located on front panel if the input signal is non-IBM standard.

PIN ASSIGNMENT



For TTL Input Signals

Pin No.	CGA 16 colors	EGA 16 / 64 colors
1	Ground	Ground
2	Ground	Secondary Red
3	Red	Primary Red
4	Green	Primary Green
5	Blue	Primary Blue
6	Intensity	Secondary Green
7	N. C.	Secondary Blue
8	H. Sync.	H. Sync.
9	V. Sync.	V. Sync.

For Analog Input Signals

D-SUB 9 Pin	VGA	D-SUB 15 Pin
1	Red	1
6	R Return	6
2	Green	2
7	G Return	7
3	Blue	3
8	B Return	8
4	H. Sync.	13
5	V. Sync.	14
9	Ground	10
9	Ground	11
9	Ground	4

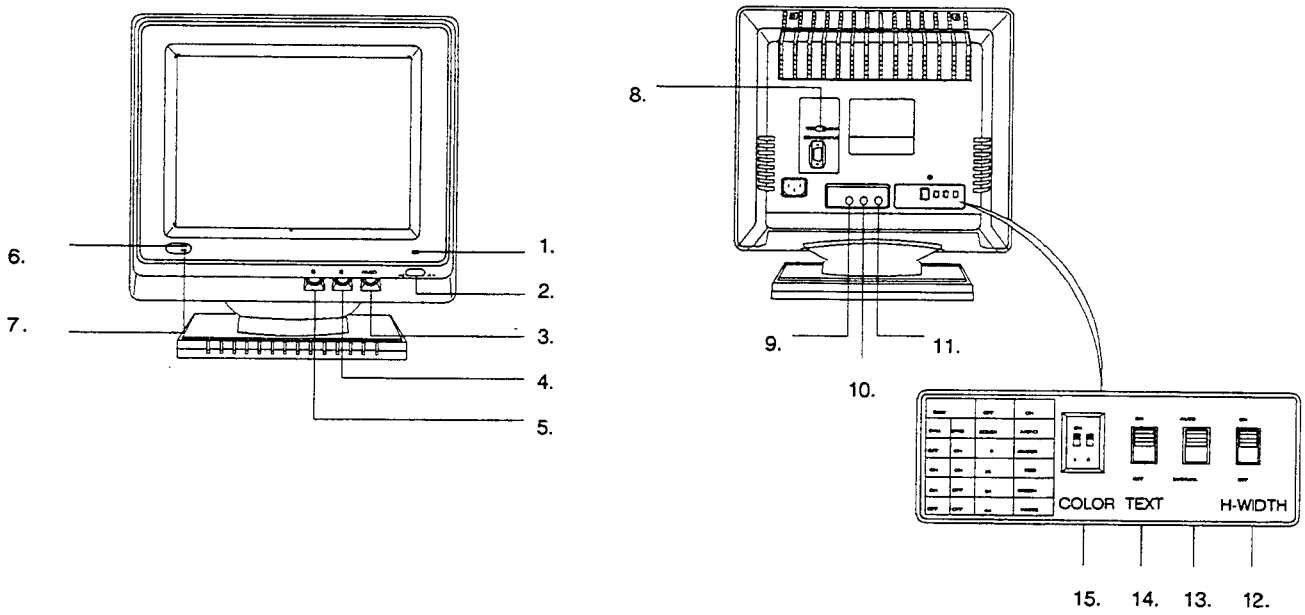
* For VGA cards, signals are fed into the monitor via an anolog cable which has 9 Pin D-SUB connector on one end and 15 Pin D-SUB connector on the other, and wired as the table listed above.

SPECIFICATION

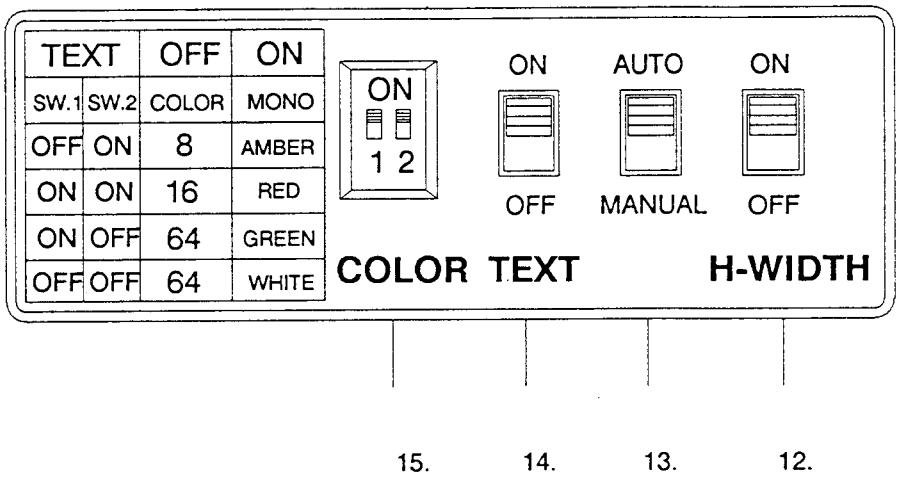
Multiscan Monitor	CMS-3435	CMS-3436
Picture Tube	13 visual diagonal inches Dark bulb, Nonglare etching Medium short persistance	
Pitch	0.29mm	0.28mm
Input Signal	Video: TTL Level Positive Analog 0.7Vp-p / 75 Ohm Positive Sync.: Separate Sync. TTL Level Horizontal sync. Positive / Negative Vertical Sync. Positive / Negative Composite Sync. TTL Level Polarity Positive / Negative Composite Sync. on Green Video Sync. 0.3Vp-p Negative (Video 0.7Vp-p Positive)	
Display Colors	Analog Input: Unlimited colors TTL: 8 / 16 / 64 color	
Synchronization	Horizontal: 15.5KHz to 38KHz (Automatically) Vertical: 50 Hz to 90 Hz (Automatically)	
Resolution	Horizontal: 1024 dots Vertical: 768 lines	
Video Band Width	40MHz	
Active Display Area	(Active display area is changed by signal timing)	
	Preset* VGA 1024x768 EGA CGA Horizontal: 245mm 250mm 250mm 240mm Vertical: 185mm 187mm 190mm 180mm *Refer To Preset Timing Chart	
Misconvergence	Less than 0.4mm	
Power Supply	AC 120V / 60Hz or 220 / 50Hz by internal setting	
Power Comsumption	75W	
Dimensions	368(W) x 378(H) x 387(D)mm	
Weight	12.8kgs	
Environmental Considerations	Operating Temperature 0°C to 40°C Humidity 20 % to 80% Storage Temperature -20°C to 60°C Humidity 10 % to 90%	

CONTROL

Before connecting MULTISCAN series monitor with IBM personal computers or compatibles and IBM graphics adapters, take time to familiarize yourself with the switches and controls that give MULTISCAN series monitor all its compabilities.



1. **Power Indicator**
   When the power is ON, the LED is lit.
2. **Power Switch**
   Used to push the power ON or OFF.
3. **Auto Switch**
   When this switch is on, the VASC (vertical auto-sizing circuit) will be activated to maintain same picture height when changing among 350 / 400 / 480 lines different vertical resolutions according to the sync polarization of IBM VGA convention. For some compatible VGA boards which require to set dip switch to support different type of monitors, their sync polarization might not be compatible with IBM standard if they are set to support multiscan monitor instead of standard VGA monitor while running VGA program. In such case, this switch should be off to make the VASC inactive without misadjusting picture height according to wrong polarization.
4. **Bright Control**
   Used to adjust the picture brightness of the screen.
5. **Contrast Control**
   Adjusts the display to the contrast preferred by the user.
6. **Analog / TTL Indicator**
   When set in TTL mode, the LED is lit.
7. **Manual / Auto Indicator**
   When set in manual mode, the LED is lit.
8. **TTL / Analog Switch**
   Used to select an input video signal - either TTL or ANALOG - of the graphics adapter. It is important to determine whether the input signal of the graphics adapter being used is ANALOG or TTL prior to connecting the adapter with your personal computer. Refer to instructions accompanying the graphics adapter for information on the input signal.
9. **H. Center Control**
   Turn this knob for the proper horizontal position of the display. Turn the knob clockwise to reposition display to the right; turn it counterclockwise to reposition to the left.
10. **V. Size Control**
    Turn this knob for the proper vertical size of the display. Turn the knob clockwise for a larger display; turn it counterclockwise for a smaller display.
11. **V. Center Control**
    Turn this knob for the proper vertical position of the display. Turn the knob clockwise for a higher display position; turn it counterclockwise for a lower display position.



12. H. Width

Switch of display preferred. When this switch is ON; the width of the display size changes.

Note: When the horizontal scanning frequency is between 15 and 20 KHz, H. Width cannot be adjusted.

13. Manual Switch

This switch selects either the IBM mode or the manual mode. When this switch is set in Auto mode, Multiscan automatically works in the IBM mode and adjusts itself to the scanning frequency, resolution and color requirements of the IBM compatible graphics adapter being used. When this switch is set in manual mode, the user must manually select the number of colors (8 / 16 / 64) needed by the graphics adapter being used with the Color Switch (see 15. below). Refer to instructions accompanying the graphics adapter being used for information on how many colors the adapter can display.

14. Text Switch

This switch controls the text mode of Multiscan. When it is ON, the text of the display will appear in one color selected by the Color Switch, regardless of the colors of the software program being used. When it is OFF, the color of the software program being used will again be displayed. The diagram below of the dip switches shows how to display text in your choice of four colors. When multiscan is used with monochrome cards (MDA or Hercules), please set the Text Switch on and select one of the four colors with the color switch (see 15 below).

15. Color Switch

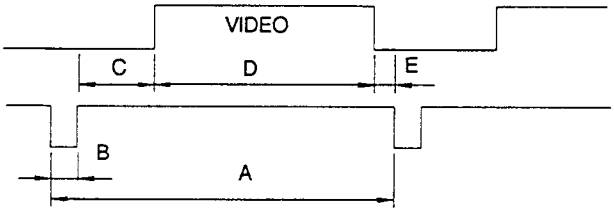
This switch operates under following mode:

TEXT SW.		OFF	ON
SW.1	SW.2	COLOR	MONO
OFF	ON	8	AMBER
ON	OFF	16	RED
ON	OFF	64	GREEN
OFF	OFF	64	WHITE

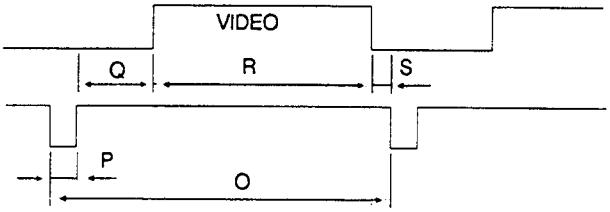
SIGNAL TIMING CHART

Separate Sync.

HORIZONTAL



VERTICAL

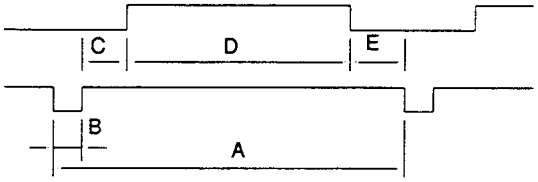


Sync. Polarity: Positive / Negative

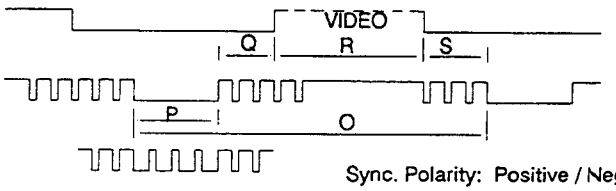
Composite Sync.

Composite Sync. TTL Level

HORIZONTAL



VERTICAL

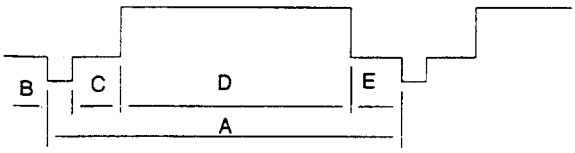


Sync. Polarity: Positive / Negative

Equalizing Pulse is available

Composite Sync. On Green Video

HORIZONTAL

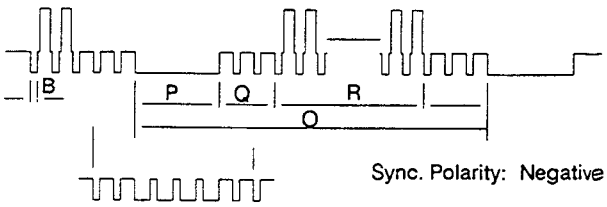


Synd. on G:

$$E = \frac{A-(D+B)\pm(5-B)}{2}$$

and $2 \leq B \leq 5uS$

VERTICAL



Sync. Polarity: Negative

Equalizing Pulse is available

PRESET TIMING CHART

Display format	VGA			CGA	EGA	8514A
Horizontal Dots	640			640	720	1024
Vertical Lines	350	400	480	200	350	768
Horizontal Frequency	31.5kHz			15.8kHz	21.8kHz	35.5kHz
1) Sync. Polarity	+	−	−	+	+	+/−
A μs	31.78	31.78	31.78	63	45.5	28.10
B μs	3.81	3.81	3.81	4.2	4.9	1.15
C μs	1.91	1.91	1.91	7.2	1.6	3.91
D μs	25.42	25.42	25.42	45	39	22.80
E μs	0.64	0.64	0.64	6.6	0	0.24
Vertical Frequency	70Hz	70Hz	60Hz	60Hz	60Hz	2) 87Hz
Sync. Polarity	−	+	−	+	−	+/−
O ms	14.27	14.27	16.68	16.4	16.68	11.50
P ms	0.06	0.06	0.06	0.075	0.6	0.11
Q ms	1.91	1.11	1.05	1.525	0.08	0.56
R ms	11.12	12.71	15.25	12.6	16	10.80
S ms	1.18	0.38	0.32	2.2	0	0.02

1) When AUTO SWITCH is on, the vertical auto-sizing circuit will be active according to sync. polarity in VGA mode.

2) 8514A uses interlace mode.

DESCRIPTION OF CIRCUITS

1. Power Supply Circuit

The power supply consists of 2 regulators, one is a non-synchronous self-excited power converter which supplies 200V, 95V, 21V, 12V, 6V, the control loop is to keep 95V regulated, Q103 serves as an error amplifier, IC101 (4N35 optical coupler) couples back the error to the primary side to control the on time of the driver Q102, thus controls the off time of the switcher Q101, this loop tends to regulate the 95V output, once the 95V is reached, Q102 turns on and Q101 turns off, then the energy stored in the transformer transfers to the secondary side. When the energy is dried out, an induced magnetic force turns Q101 on, the current flows through Q101 to the current limiter R110, a sawtooth voltage is thus set up across R110, this voltage couples through R109 and C110 to the base of Q102, imposes on a DC level controlled by the error amplifier Q103. When the 95V tends to drop due to a heavy load, the DC voltage of Q102 base drops too, so it takes longer time for the sawtooth imposed on this DC to reach the on-threshold of Q102 base, the result is that Q101 will switch on for a longer time, and output more energy to make the 95V output back to its level. When the load is getting lighter, the 95V outputs tends to rise, this makes the DC in Q102 base higher, so the sawtooth takes less time to turn Q102 on, and cut Q101 off, so Q101 will turn on for a shorter period, the energy being transferred is less and the 95V output is kept constant.

The multiple secondary output DC voltages are as follows:

200V	to be further regulated to supply horizontal deflection output stage.
95V	mainly for video output amplifier and horizontal drive circuit.
21V	is for vertical deflection output amplifier and frequency voltage conversion circuit.
12V	is for deflection processing IC and sync separation circuit.
6V	is for CRT heater and logic circuit on interface board.

The 200V output is further regulated by a synchronous step down regulator to a voltage ranging from 50V up to 120V for the horizontal deflection output circuit and maintains the CRT anode voltage fairly stable in spite of various scanning frequencies.

The step down converter is synchronized with horizontal scanning frequency. The horizontal drive pulse is taken from IC301(LA7850), amplified by Q104, then differentiated through C122, and the voltage sensed for comparing is taken from the FBT secondary voltage, error amplifier Q108 amplifies the difference between reference voltage (ZD104 + D114's forward voltage) and the sensed voltage for comparing, the result is a DC level variation in the base of Q105. The differentiated horizontal pulse from C122 is imposed on this DC, thus the DC level variation can determine the on / off time of Q105. Q105 will turn Q106 on / off, and Q106 drives the output Q107 through the drive transformer. When Q107 is on, current flows through choke L104 and charges C128 to the desired level, when Q107 is off, the energy stored in L104 will charge C128 through the fly-wheel diode D112 to maintain the output voltage. This output voltage applies to the FBT and generates the desired H.V.. Since the sensed voltage for comparing is taken from FBT secondary side, it is propotional to the H.V., any variation in H.V. will reflect on the sensed voltage, through the control loop, the supplied DC voltage for FBT always tends to regulate this variation and generates a fairly stable H.V.

2. Video Circuit

The input signals from 9 Pin D type connector are first selected by the TTL / Analog Switch (SW401). If the video signals are analog RGB signals, it will be sent directly to the video preamplifier IC501 (M51387P), and the signals' level is controlled by Q403 and Q404 for users to adjust picture contrast to their preference. If the video signals are TTL RGB signals, before being sent to the video preamplifier IC501, the signals are first processed with color mapping and mixing circuit.

TTL RGB signals are sent to IC401(82S147) through buffer IC402(7407). IC401 is a PROM (Programmable Read Only Memory) served as color mapping table for different colors combination. Pin 17 and Pin 18 of this IC are mode control pins for selecting 8, 16, 64 colors or mono text. When the Auto / Manual Switch (SW1) located on the rear panel is set at Auto mode, IC401 will automatically output 8, 16 or 64 colors signals according to IBM CGA / EGA standard. But if the input signals are from computers not compatible with IBM PC, then SW1 should be set at Manual mode, and 8, 16 or 64 colors can be displayed by setting the Dip Switch (SW3) manually. When Text Switch is ON, IC401 will output signals to display single color, and users can select Red, Blue, Green and Amber by setting Dip Switch (SW3).

Each three color signal pairs are then mixed together by Q406, Q407, Q410, Q411, Q414 and Q415 to be RGB signals with analog values. The level of these signals is also controlled by Q403 for users to set contrast. Finally these signals are output to the video preamplifier IC501 through buffers Q408, Q412 and Q416.

IC501(M51387) is a video processing IC equipped with three DC amplifiers to preamplify RGB signals from 0.6V to 2V. The voltage gain of these amplifiers is all DC controlled, so simple voltage divider with resistors and trimmers can be used to adjust the voltage gain of each RGB signal's amplification and thus achieve a well balanced white picture. Clamping circuit is also included in this IC to obtain a constant black level on the amplified video output signals.

Let us take Red signal channel for instance, and the same principle applies on both Green and Blue signal channels. The input signal is AC coupled through C501 to Pin 3 of IC501, the voltage setting on Pin 4 of IC501 determines the voltage gain of the Red Preamplifier, this voltage is controlled by VR501 together with R504 and R505. VR501 is thus designated R Subcontrast adjustment which is to be adjusted together with the other two Subcontrast adjustments to achieve a well balanced white picture.

Clamping pulse to Pin 15 of IC501 is taken from Pin 12 of IC803(74LS123) to trigger the internal DC Restoration circuit in order to obtain a constant black level of the Red video signal output from Pin 29 of IC501. Now this Red signal output is ready to drive video output stage located on CRT board.

Voltage setting on Pin 14 of IC501 further determines the voltage gain for all three channels and can be used as user contrast control. An ACL (Automatic Contrast Limit) circuit is equipped in this monitor to prevent the CRT from being overdriven. When anode current grows larger than the limiting threshold, the voltage on Pin 14 will drop and decrease the gain to force the video signal output from IC501 smaller and the anode current is limited within 350uA for long term operation.

The video output stage contains three identical cascode amplifiers to amplify the video signals from IC501 to the level of 45Vp-p capable of driving CRT. These large signals are AC coupled to the CRT cathods, and the Brightness control circuit introduces a DC voltage onto each cathod for CRT cut-off and Brightness control.

3. Deflection Circuit

3.1 Sync Processing Circuit

The sync processing circuit can handle both TTL level separate or composite sync of any polarity and composite sync on Green Video of negative polarity. For TTL sync, the horizontal sync is sent to Pin 2 of IC404(74LS136), then processed by Q421, Q423 and XOR gate of IC404 to get a positive sync pulse on Pin 6 of IC404 in spite of the polarity of input sync. For composite sync on Green Video, signal is sent to peak detector Q418, the detected sync tip is then amplified by Q419, Q420 and shaped by XOR gate to get also a positive sync pulse on Pin 11 of IC404. The monitor can not synchronize with two sync signals at the same time, so Q422 serves as a switch to turn off the detected composite sync pulse whenever there is a TTL horizontal sync detected. The positive sync pulse is then processed by Q424, Q301 and sent to Pin 1 of IC301(LA7850) for sychronization.

For TTL separate vertical sync, it is sent to Pin 10 of IC404 and output from Pin 8 of IC404, but if the vertical sync is in composite form, then it is filtered out by R469, C419, R470, C420 from the sync pulse detected on Q424, and sent to Pin 9 of IC404, also output from Pin 8 of IC404 to be further processed.

3.2 Frequency Voltage Conversion Circuit

The horizontal sync pulse from Q301 is also sent to Pin 7 of frequency voltage converter IC302 (IR9331) to be converted into a DC voltage which is proportional to the sync frequency. This voltage is compared with the reference voltage by the comparator circuit to identify the horizontal frequency and make necessary changes of the parameters in the deflection circuit.

The voltage output of the horizontal frequency voltage conversion circuit has an upper limit about 14V set by R342, R343 and D306, also a lower limit about 5.5V set by D307 and IC301 (OP Amp.). These limits ensure that the monitor will not go out of the specified scanning range and cause any damage of the output stage.

The vertical sync pulse from Pin 8 of IC404 is first processed by IC405 to obtain uniform polarity pulse in spite of input sync polarity change. It is then sent to both IC301(LA7850) for sychronization and IC202(HA17555) for frequency voltage conversion. The converted DC voltage is used to determine whether input frequency is higher than 80Hz, if it is, then the vertical deflection parameters are preset to conform with IBM 8514A graphic standard which uses 87Hz for vertical interlaced scanning frequency.

3.3 Comparator Circuit

The comparator circuit including IC304 and its peripherals follows the criterion listed below to achieve necessary changes and presettings of deflection circuit parameters. It is powered with a precise 16V regulated from 21V to ensure the circuit free from fluctuations caused by power supply. Q305 and Q306 make up the 16V regulator and VR 303 can be adjusted to output exact 16V DC.

A. Horizontal Oscillation Presetting

Frequency(KHz)		15 – 26	26 – 38
IC 304	Pin 4	High	Low
(LM339)	Pin 13	Low	High
IC 306	Pin 3,4	On	Off
(4066)	Pin 1,2	Off	On
Oscillator		Hold (2)	Hold (1)

Hold (1) is first set for 26 – 38KHz range, then set Hold (2) for 15 – 26KHz, in the latter, Hold (1) is included in the oscillation circuit and should not be altered when adjusting Hold (2).

B. Horizontal Position Presetting

Graphics	VGA	EGA	CGA	8514A
IC304				
Pin 1	Low	High	High	Low
Pin 2	Low	Low	High	Low
Pin 13	Low	Low	Low	High
IC306				
Pin10,11	Off	On	On	Off
H. Center	(1)	(2)	(3)	(4)

C. Horizontal Retrace Time Presetting

Frequency(KHz)	15 – 20	20 – 38
IC 304 Pin 2	High	Low
Q307	On	Off
Retrace	Longer	Shorter

D. Horizontal Linearity Presetting

Graphics	VGA	EGA	CGA
IC304 Pin 1	Low	High	High
(LM339) Pin 2	Low	Low	High
Q309	Off	Off	On
Q310	Off	On	On
S-Curve	C322	C322	C322
Capacitor	Alone	//C330	//C330
Value			//C331

3.4 Horizontal Deflection Circuit

IC301(LA7850) performs the signal processing for both the horizontal and vertical output stages. The horizontal sync from Q301 is sent to Pin 1 of IC301, and the phase of the sync pulse is shifted for horizontal position control. The shifted level is controlled by Resistors connected to Pin 2, and the duty of the shifted sync pulse is determined by R308 connected to Pin 3. Flyback pulse comes to Pin 4 and a sawtooth waveform is generated to be compared with the phase of the shifted sync pulse by the AFC (Automatic Frequency Control) circuit of IC301. Control voltage determined by the AFC ciucuit is output from Pin 7, then fed into Pin 8 through R310, Pin 8 is the input pin of VCO (Voltage Control Oscillator), and locks the VCO to be sychronous with the input sync pulse.

The synchronized VCO output is further shaped for driving the output stage, drive signal is output from Pin 12. Voltage setting on Pin 11 determines the duty cycle of the drive pulse. Pin 13 is the input of the X-Ray protector, once the Anode voltage is higher than the set threshold, the sensed voltage will trigger Pin 13 and turn the SCR on to shut down the drive signal, the horizontal deflection output stage is thus turned off to avoid excessive radiation from CRT.

The drive pulse from Pin 12 is sent to transistor Q302, through T301, drives the horizontal output transistor Q303 on and off. When Q303 is turned on, current flows through horizontal deflection coil and the primary winding of the flyback transformer stores energy. When Q303 is turned off, B+ charges C322 through deflection coil, current flows in opposite direction, and the energy stored in FBT couples to the secondary side, supplys Anode voltage and the secondary load. A H-Width coil connected to deflection coil can be adjusted for suitable width.

3.5 Vertical Deflection Circuit

The vertical sync pulse from Pin 6 of IC 405 is sent to Pin 19 of IC301(LA7850) to trigger the vertical oscillator to be synchronous with the input sync. The synchronized vertical sawtooth signal is then taken from Pin 16 to Pin 2 of vertical output amplifier IC201 (LM7837). IC201 contains its own driver functions, so the AC / DC feedback loop can be implemented on this single IC, problems with crosstalk from the horizontal signal affecting interlace characteristic is reduced. The DC feedback is sent to Pin 7 through VR206, R243 and VR203, AC feedback is also sent to Pin 7 through VR205, R243. Adjusting VR205 and VR 206 can achieve best linearity, VR203 determines the DC bias point of the output amplifier. Voltage setting on Pin 4 will determine the sawtooth peak level of the Ramp generator circuit, thus can be used to adjust for vertical size control. Q201, Q214 – Q219 and their peripherals serves as vertical auto sizing circuit to maintain same vertical size when changing among 350 / 400 / 480 lines resolutions according to IBM VGA conventions. VR201 is user vertical size control and VR202 determines the suitable control range for VR201.

4. CRT Bias Circuit

The DC bias voltages for R, G, B CRT cathods are supplied by Q213, Q206 and Q207. Q208, Q209 and Q210 control the DC level of each gun by adjusting VR211, VR212 and VR213. Q212 is for brightness control, it solely controls the DC levels of all three guns. VR214, VR215 and VR216 are sub-bright controls to achieve precise gray background over the entire range of brightness control.

ADJUSTMENTS

Monitor adjustments contained in this section should be followed whenever a major component is replaced, such as a CRT / YOKE assembly or a circuit board. Some adjustments may also be required periodically to correct for component aging. Adjustments should be performed in specific order given in the following paragraphs.

1. Power Supply Circuit

(1) VR101 +95V Adjustment
(2) VR102 Def. B + Limit Adjustment
(3) VR103 +6V Adjustment

2. Horizontal Deflection Circuit

(1) VR301 H-Center Adjustment 1
(2) VR302 H-Hold Adjustment 1
(3) VR303 +16V Adjustment
(4) VR304 Horizontal Frequency Voltage Conversion Adjustment
(5) VR305 H-Center Adjustment 3
(6) VR306 H-Center Adjustment 2
(7) VR307 H-Hold Adjustment 2
(8) VR308 H-Center User Control
(9) VR309 X-Ray Protector
(10) VR310 High Voltage Adjustment
(11) VR311 H-Center Adjustment 4
(12) L305 H-Width Adjustment

3. Vertical Deflection Circuit

(13) VR201 V-Size User Control
(14) VR202 V-Subheight Adjustment
(15) VR203 V-Bias Adjustment
(16) VR204 Side-Pin Adjustment 1
(17) VR205 V-Linear Adjustment 1
(18) VR206 V-Linear Adjustment 2
(19) VR207 Side-Pin Adjustment 2
(20) VR208 Vertical Frequency Voltage Conversion Adjustment
(21) VR218 V-Hold Adjustment

4. Video Circuit

(22) VR211 R Bias Adjustment
(23) VR212 G Bias Adjustment
(24) VR213 B Bias Adjustment
(25) VR214 R Subbright Adjustment
(26) VR215 G Subbright Adjustment
(27) VR216 B Subbright Adjustment
(28) VR401 User contrast control
(29) VR501 R Subcontrast Adjustment
(30) VR502 G Subcontrast Adjustment
(31) VR503 B Subcontrast Adjustment
(32) VR504 Subcontrast

For quick reference, page 21 shows the locations of all adjustments.

When adjusting the monitor, receive a full screen white pattern set at 20 ft-L unless otherwise specified.

1. Power Supply Voltage Check

When the monitor is working normally, the voltages at plug P301 on main board are as follows:

V1 95V± 0.5V for video o/p AMP
V2 Ground
V3 21V± 0.5V for vertical o/p AMP

Voltages at P405 on interface board are as follows:

B1 12V± 0.5V for deflection IC & video preamp
B2 Ground
B3 6V± 0.1V for heater and logic circuits

(1) Receive VGA 400 lines Signal with full white pattern.
(2) Adjust VR101 to obtain 95V±0.5V.
(3) Adjust VR102 to Mechanical center position.
(4) Adjust VR103 to obtain 6V±0.1V.

2. Sync and Deflection Circuit

2.1 Horizontal Frequency Conversion Circuit

(1) Receive VGA (400 lines) Signal with full screen white pattern.
(2) Adjust VR303 to obtain 16V±0.2V on TP1.
(3) Adjust VR304 to obtain 12.2V±0.1V on TP6.

2.2 Horizontal Oscillation

(1) Receive VGA (400 lines) Signal with cross hatch pattern.
(2) Bypass the sync signal by connecting a 10u /25V capacitor to TP2 and ground, capacitor positive side is on TP2.
(3) Adjust VR302 to make the picture stand still or move slowly toward left or right.
(4) Receive CGA signal with cross hatch pattern.
(5) Adjust VR307 to make the picture stand still or move slowly toward left or right.
(6) Disconnect 10u/25V capacitor, check monitor picture be steady when receiving display modes range from standard VGA up to 8514A, if not, repeat procedures (1) through (5) more carefully.

2.3 Vertical Oscillation

(1) Receive VGA (400 lines) signal with cross hatch pattern.
(2) Adjust VR208 to obtain 7.8V±0.2V on TP8.
(3) Disconnect VGA input signal.
(4) Adjust VR218 to obtain 50Hz±1Hz vertical free-run oscillation. Use counter or scope to measure frequency on the positive side of the vertical deflection coil, which is easily accessed on one of the yoke assembly contact points.

2.4 High Voltage Circuit

(1) Receive VGA (400 lines) signal with full screen.
(2) Adjust contrast and bright controls to minimum intensity.
(3) Adjust VR310 to obtain 31.4V±0.2V on TP7. This reading is approximately equivalent to 24KV of CRT Anode High Voltage.
In some extreme cases, TP7 may not reach 31.4V when adjusting VR310. It's because the VR102 adjustment limits the DC voltage supply to FBT, so put the VR310 in mechanical center position, then adjust VR102 for TP7 to be 31.4V±0.2V.
(4) Adjust VR309 to obtain 8.2V±0.1V on TP9, this will set the X-ray protector to hold down the horizontal deflection output when the Anode High Voltage exceeds 29KV.

2.5 Horizontal Center

(1) Receive VGA (400 lines) signal with full screen white pattern.
(2) Adjust VR301 to ensure that the external H. Center control VR308 has a symmetric range to shift the picture toward left and right then adjust VR308 to put the picture in the center of the screen.
(3) Receive EGA signal with full screen white pattern.
(4) Adjust VR306 to put the picture in the center of the screen.
(5) Receive CGA signal with full screen white pattern.
(6) Adjust VR305 to put the picture in the center of the screen.
(7) Receive 1024X768 signal with full screen white pattern.
(8) Adjust VR311 to put the picture in the center of the screen.

2.6 Vertical Linearity

(1) Receive VGA (400 lines) signal with cross hatch pattern.
(2) Adjust V. BIAS VR203 to the mechanical center position.
(3) Adjust VR206 so the top blocks are equal to the bottom blocks.
(4) Adjust VR205, so the center blocks are equal to the top and bottom blocks.

2.7 Vertical Size

(1) Receive 1024X768 signal with cross hatch pattern.
(2) Adjust the external user control VR201 clockwise to obtain maximum vertical size.
(3) Adjust VR202 to obtain full screen picture height.

(4) Observe the picture to see if there is any fold over on top or compression at the bottom of the picture, adjust VR204 to obtain a normal picture.
(5) Readjust VR201 to obtained 187mm ± 2mm picture height.
(6) Receive CGA signal with cross hatch pattern.
(7) Check picture height be 180mm ± 3mm.
(8) Receive one of VGA signals (350/400/480 lines).
(9) Turn the Auto Switch on the front panel to ON position.
(10) Check picture height be the same 185mm ±3mm when changing among the 350/400 /480 lines different vertical resolution display modes.

2.8 Side Pincushion Correction

(1) Receive EGA signal with cross hatch pattern.
(2) Adjust VR204 for best side Pincushion correction.
(3) Receive VGA 400 lines and 480 lines signals and check side pincushion correction, fine tune VR204 if necessary to obtain best correction.
(4) Receive 1024X768 signal with cross hatch pattern.
(5) Adjust VR207 to obtain best side Pincushion Correction.

2-9 Horizontal Size

(1) Receive VGA (400 lines) signal with cross hatch pattern.
(2) Adjust L305 to obtain 250mm ± 2mm picture width.

3. Video Circuit

Prior to the video circuit adjustment, all sync and deflection circuit adjustments must be completed, the monitor must have been warmed up for more than 30 minutes.

Video signal must have 75Ω impedance and correct voltage at the monitor input terminal. Before adjusting, make sure VR501, 502, 503, 214, 215, 216, 211, 212, and VR213 are preset to the mechanical center position.

3.1 Cut Off Adjustment

(1) Receive VGA (400 lines) signal with a blank pattern (black).
(2) Turn the screen VR on the FBT counterclockwise to minimum, then turn it clockwise until the background raster is just visible on the screen.
(3) Adjust VR408 and VR410 to obtain a gray blackground raster.
(4) Turn the screen VR counterclockwise to the position that the blackground raster is just diminished.

3.2 White Balance Adjustment

(1) Receive VGA (400 lines) signal with full screen white pattern.
(2) Set user contrast control to its minimum and bright control to its maximum.
(3) Adjust VR214, VR215, VR216 to read CIE coordinate X= 0.281± 0.015, Y= 0.311± 0.015 using Minolta Color Analyzer II.
(4) Set user contrast control and bright control to their maximum.
(5) Adjust VR501, VR503 to read the same CIE coordinate as step (3).
(6) Set user contrast control to its maximum and bright control to its minimum.
(7) Check CIE coordinate be within ± 0.015 limits, if not, fine tune VR214, VR215, VR216 for compensation.
(8) Adjust user contrast control to 20 ft-L and check for CIE color coordinate, if it is not right, go back to step (4).

3.3 Brightness Adjustment

(1) White balance must have been adjusted prior to this adjustment.
(2) Receive VGA (400 lines) signal with stair step pattern.
(3) Set user contrast and bright control at their maximum.
(4) Adjust screen VR on FBT so that the first step of the stair step signal can just be seen.
(5) Receive same signal with 60 X 60mm white pattern.
(6) Check brightness be within 55 ft-L through 70 ft-L.

4. Focus Adjustment

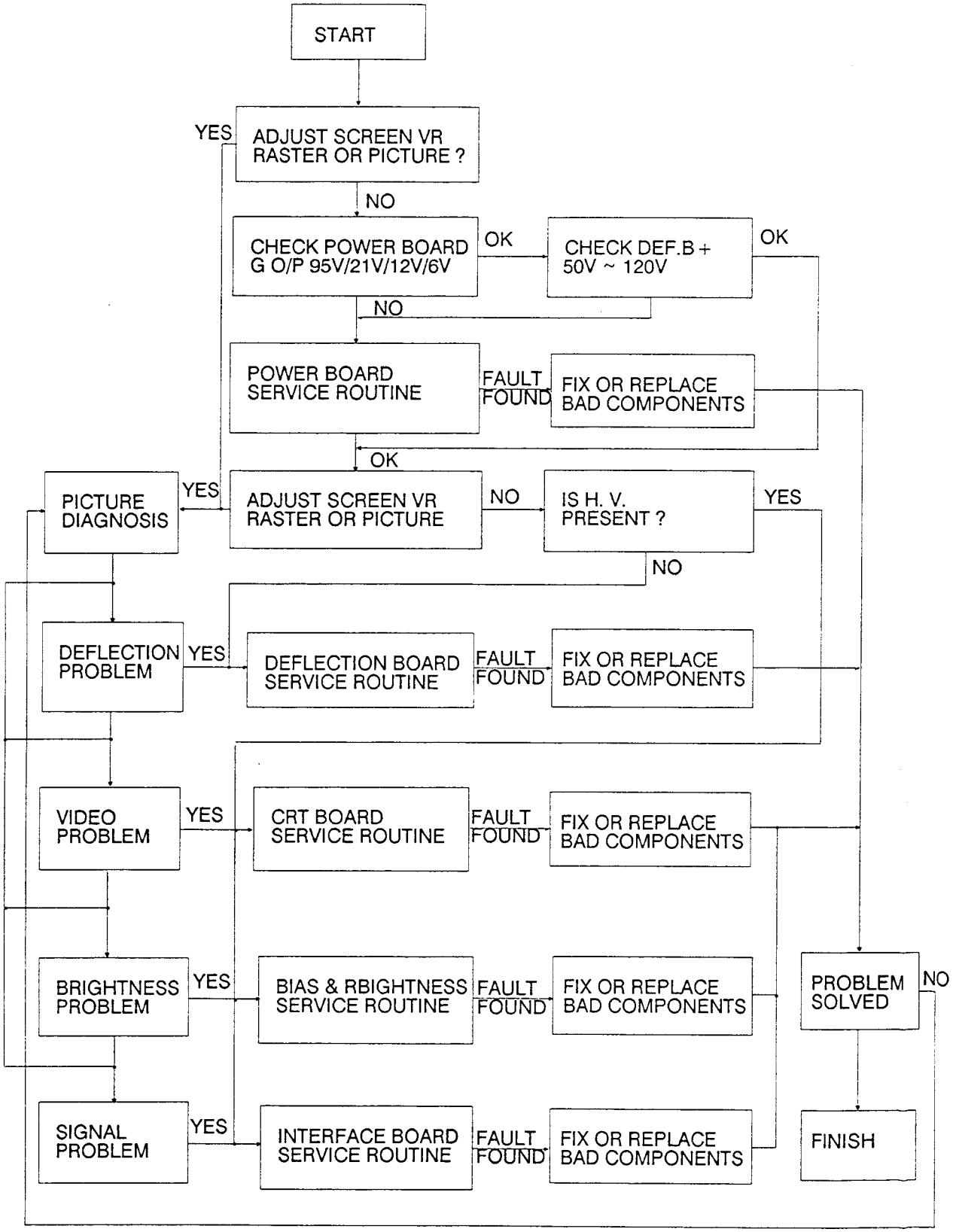
(1) Receive VGA (400 lines) signal.
(2) Set user contrast and bright control at their maximum.
(3) Adjust focus control on the FBT so that focus at the middle points between the center of the screen and the four corners to its best. This is to make the focus for the full screen area even.

TROUBLE SHOOTING

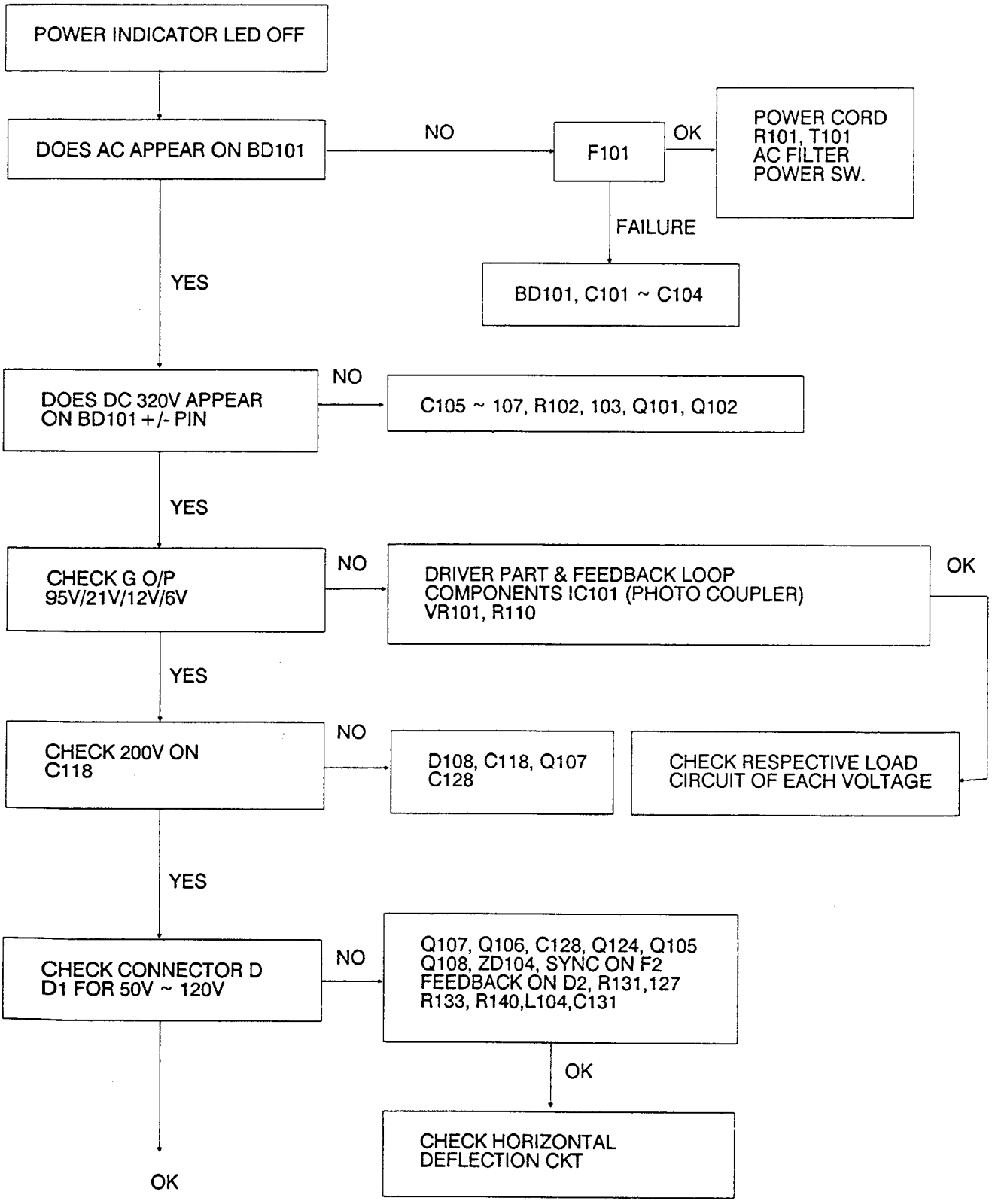
Should trouble shooting be required, the service routines are provided on the following pages to facilitate location of a fault. In addition, materials listed below may be helpful while trouble shooting.

(1) Description of Circuit
(2) Basic circuit diagram
(3) Block diagram

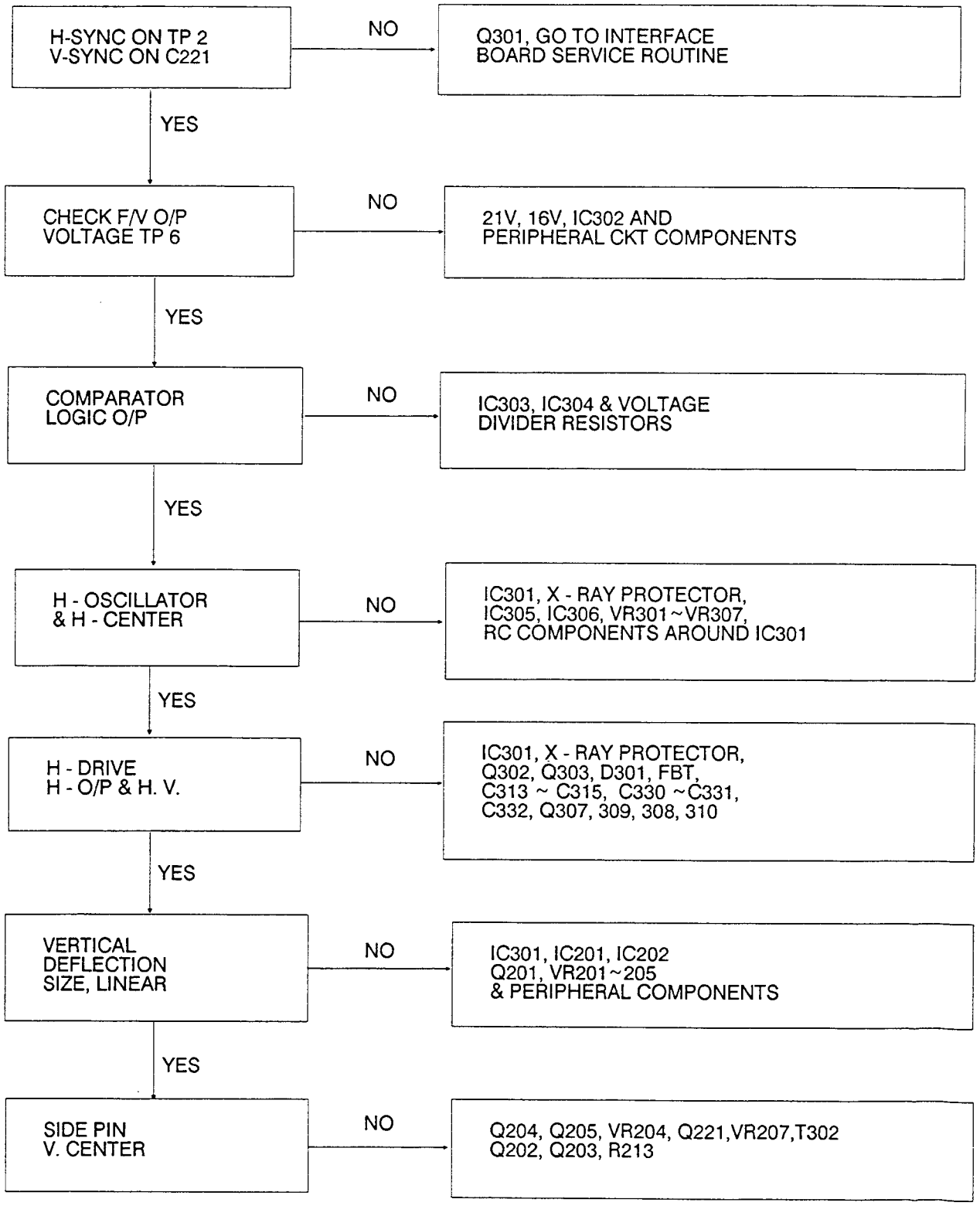
MAIN SERVICE ROUTINE



A. POWER BOARD SERVICE ROUTINE

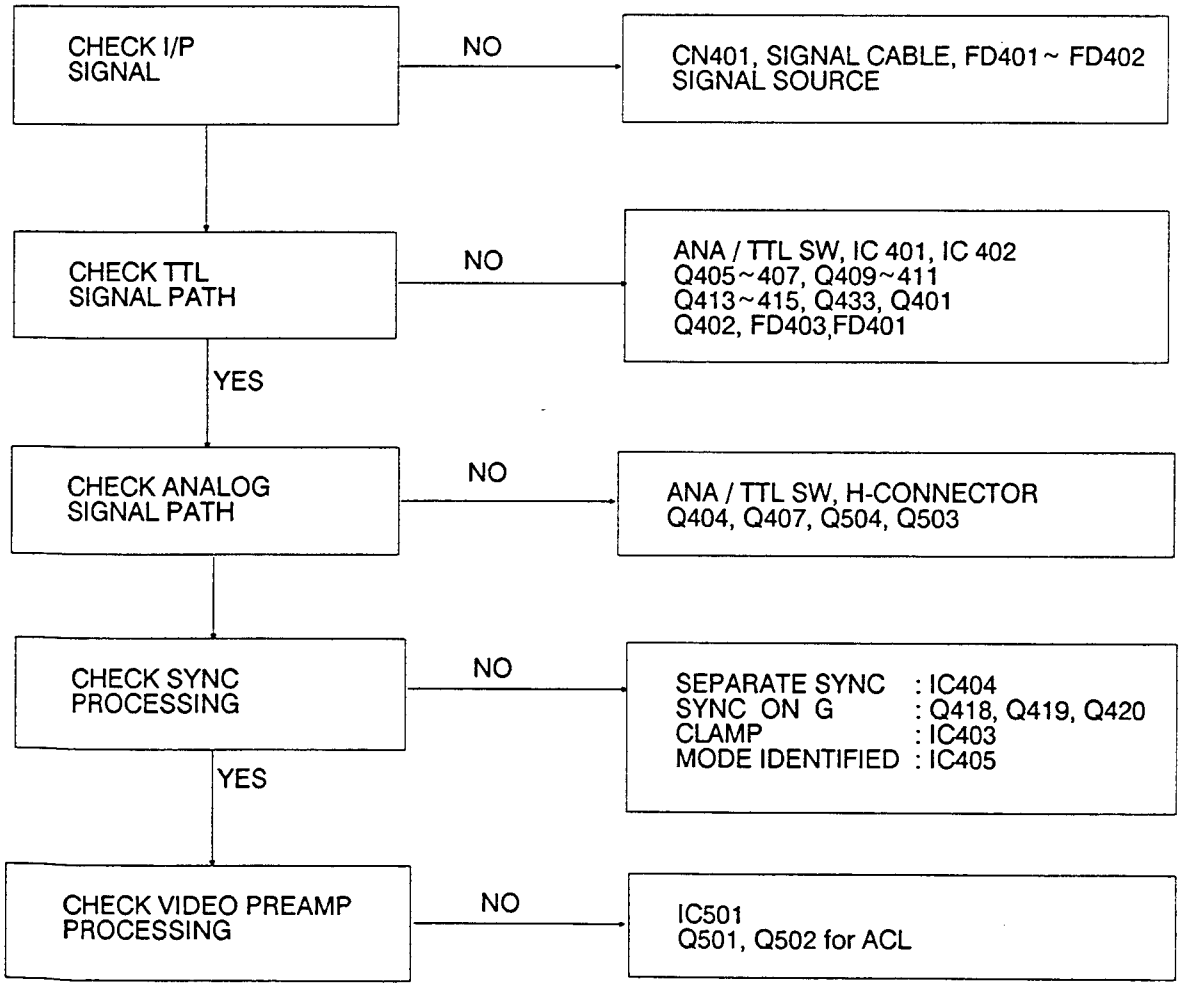


B. DEFLECTION BOARD SERVICE ROUTINE

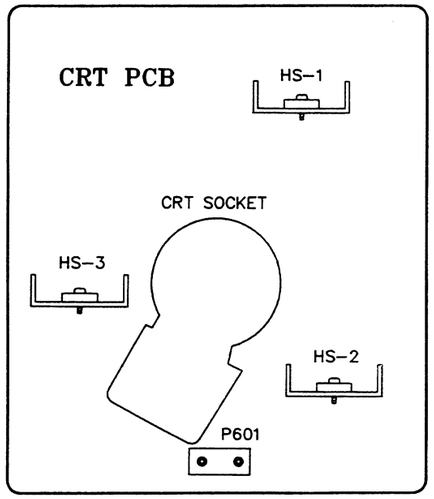

H-SYNC ON TP 2
V-SYNC ON C221
NO
Q301, GO TO INTERFACE BOARD SERVICE ROUTINE
YES
CHECK F/V O/P VOLTAGE TP 6
NO
21V, 16V, IC302 AND PERIPHERAL CKT COMPONENTS
YES
COMPARATOR LOGIC O/P
NO
IC303, IC304 & VOLTAGE DIVIDER RESISTORS
YES
H - OSCILLATOR & H - CENTER
NO
IC301, X - RAY PROTECTOR, IC305, IC306, VR301~VR307, RC COMPONENTS AROUND IC301
YES
H - DRIVE H - O/P & H. V.
NO
IC301, X - RAY PROTECTOR, Q302, Q303, D301, FBT, C313 ~ C315, C330 ~C331, C332, Q307, 309, 308, 310
YES
VERTICAL DEFLECTION SIZE, LINEAR
NO
IC301, IC201, IC202 Q201, VR201~205 & PERIPHERAL COMPONENTS
YES
SIDE PIN V. CENTER
NO
Q204, Q205, VR204, Q221,VR207,T302 Q202, Q203, R213

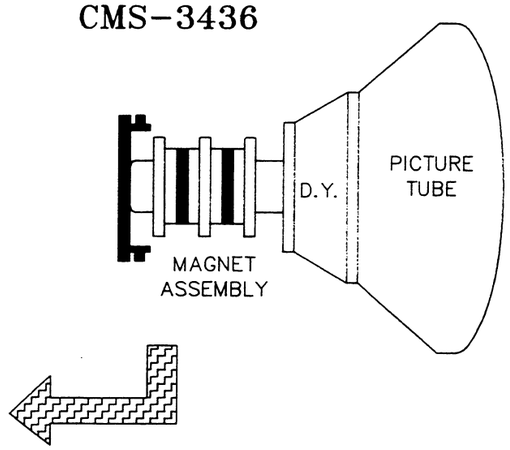
C. VIDEO CIRCUIT SERVICE

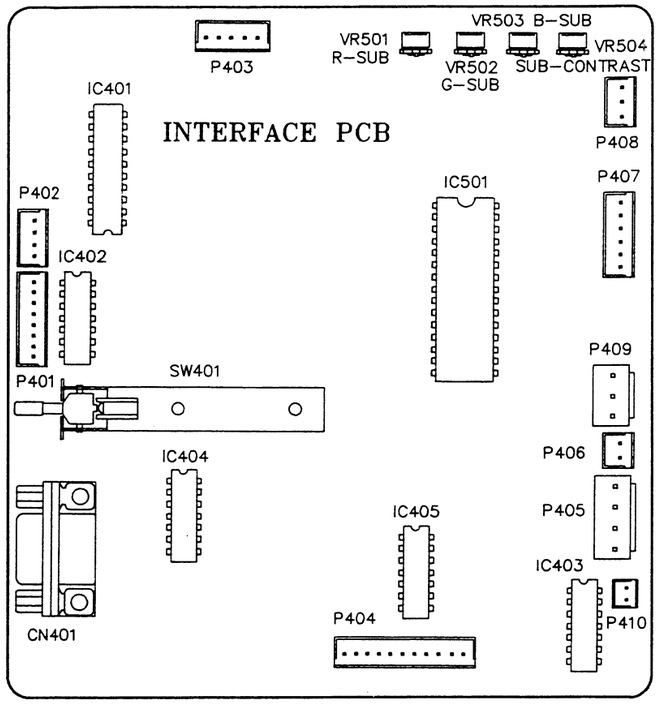
(1) Check each connection to the CRT.
(2) The three channels for R G B video AMP. are identical,so it's convinent to compare the fault one with the normal channel and find the fault location.
(3) If all three channels are not normal, please check the 99V for the output AMP.and the 12V for preamp, then check blanking Q703,Q704 and contrast, brightness control circuit.

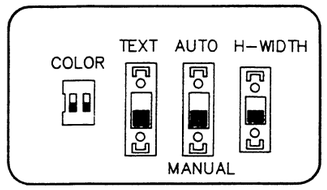

CHECK I/P SIGNAL
NO
CN401, SIGNAL CABLE, FD401 ~ FD402 SIGNAL SOURCE
CHECK TTL SIGNAL PATH
NO
ANA / TTL SW, IC 401, IC 402 Q405~407, Q409~411 Q413~415, Q433, Q401 Q402, FD403,FD401
YES
CHECK ANALOG SIGNAL PATH
NO
ANA / TTL SW, H-CONNECTOR Q404, Q407, Q504, Q503
CHECK SYNC PROCESSING
NO
SEPARATE SYNC : IC404
SYNC ON G : Q418, Q419, Q420
CLAMP : IC403
MODE IDENTIFIED : IC405
YES
CHECK VIDEO PREAMP PROCESSING
NO
IC501 Q501, Q502 for ACL

CMS-3436

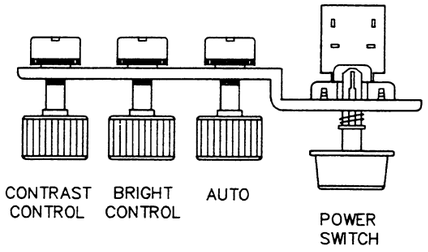


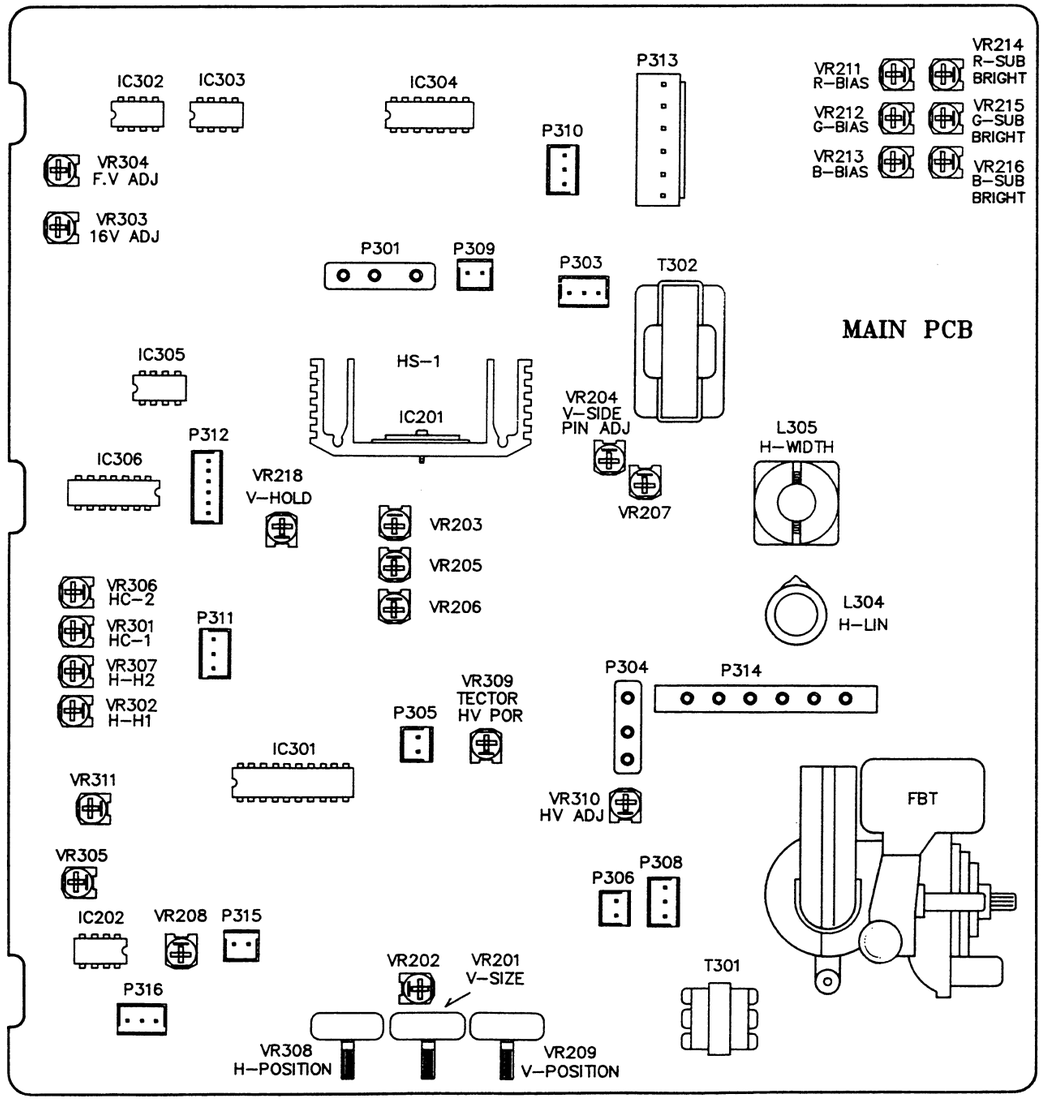


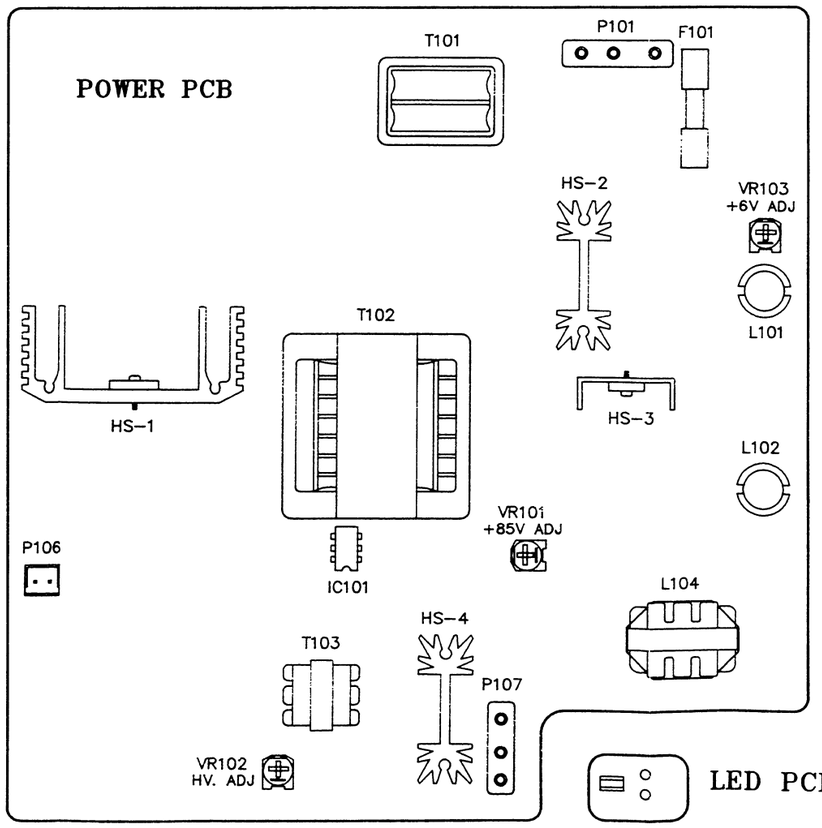




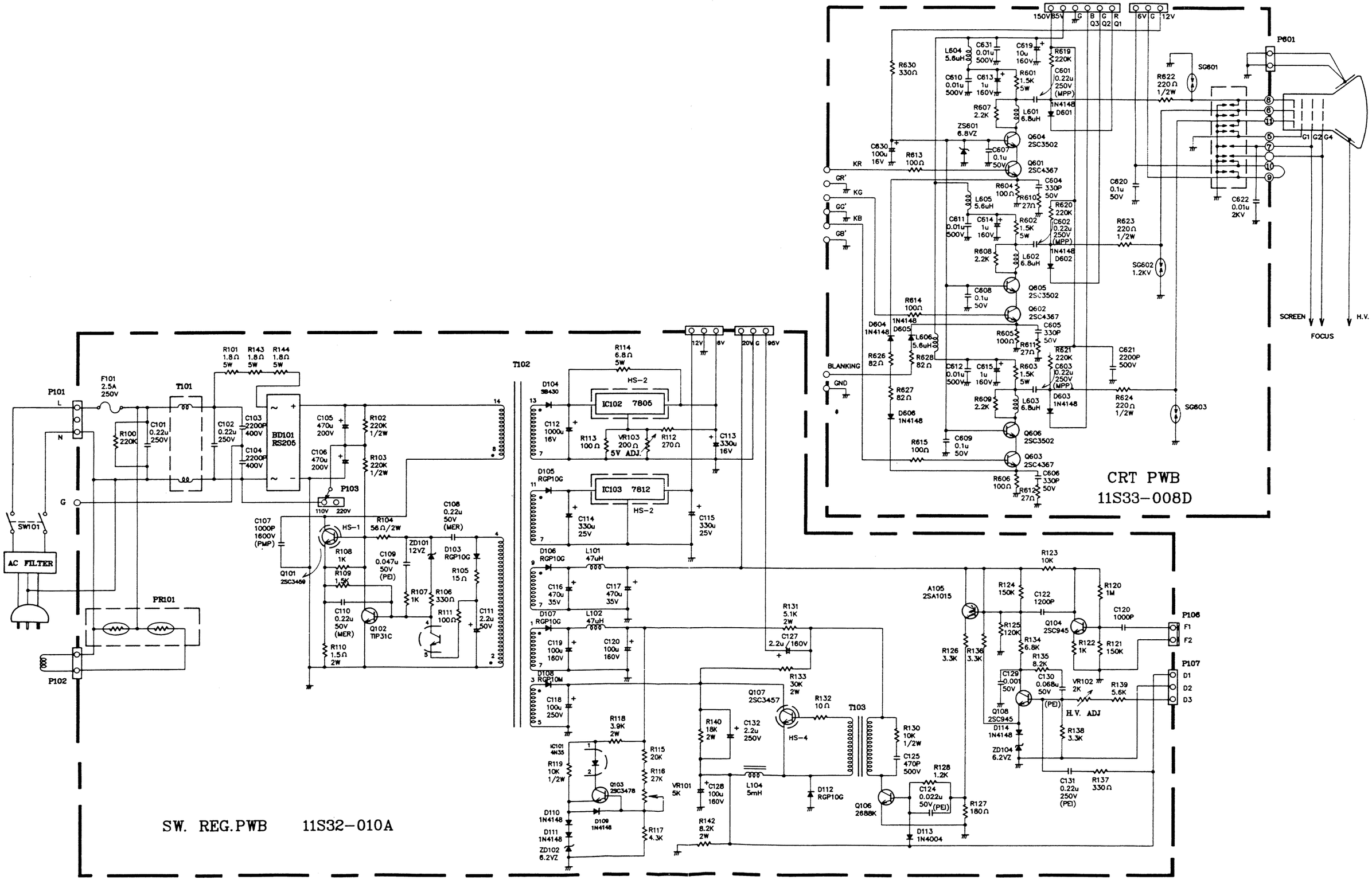
SWITCH PCB

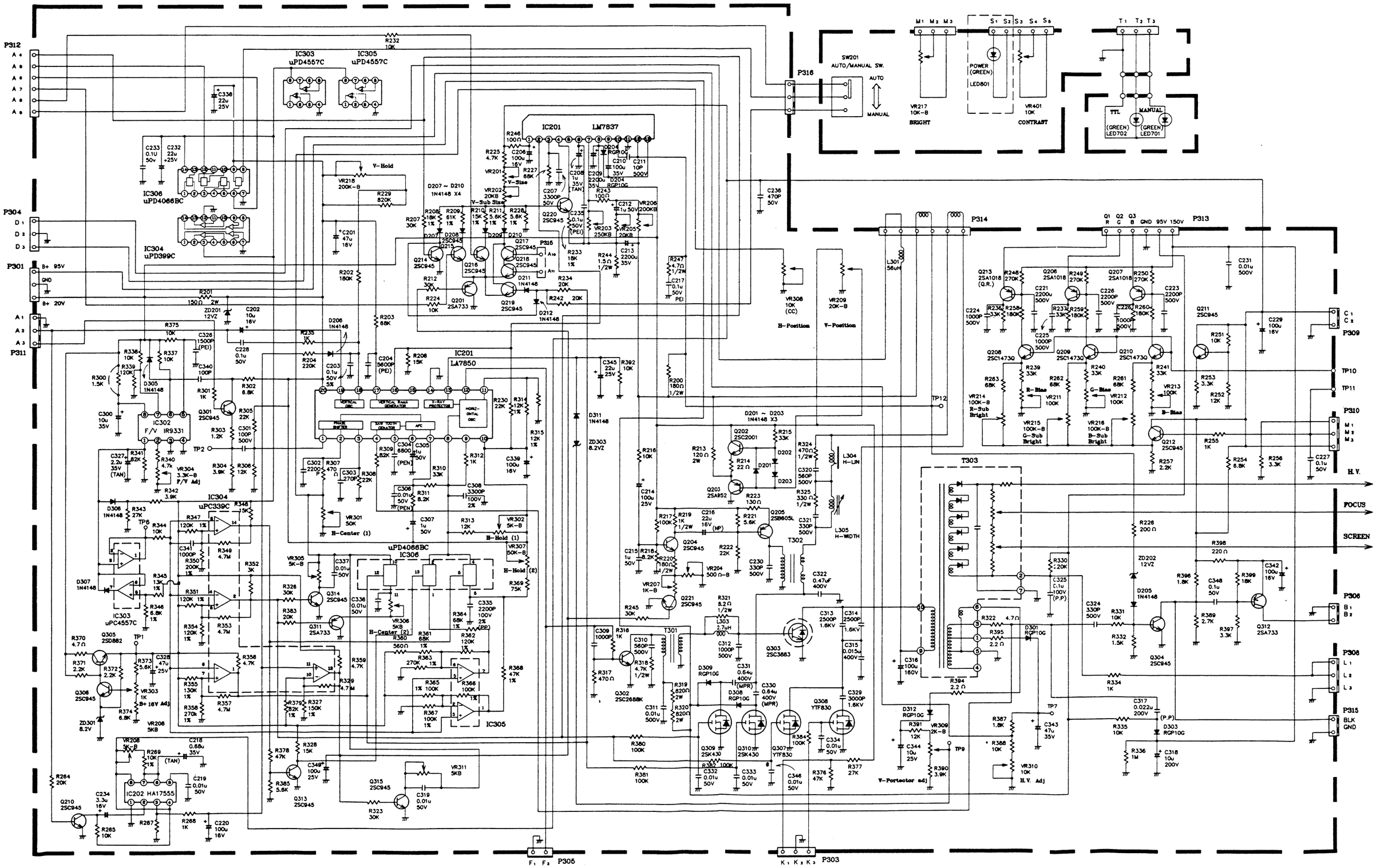


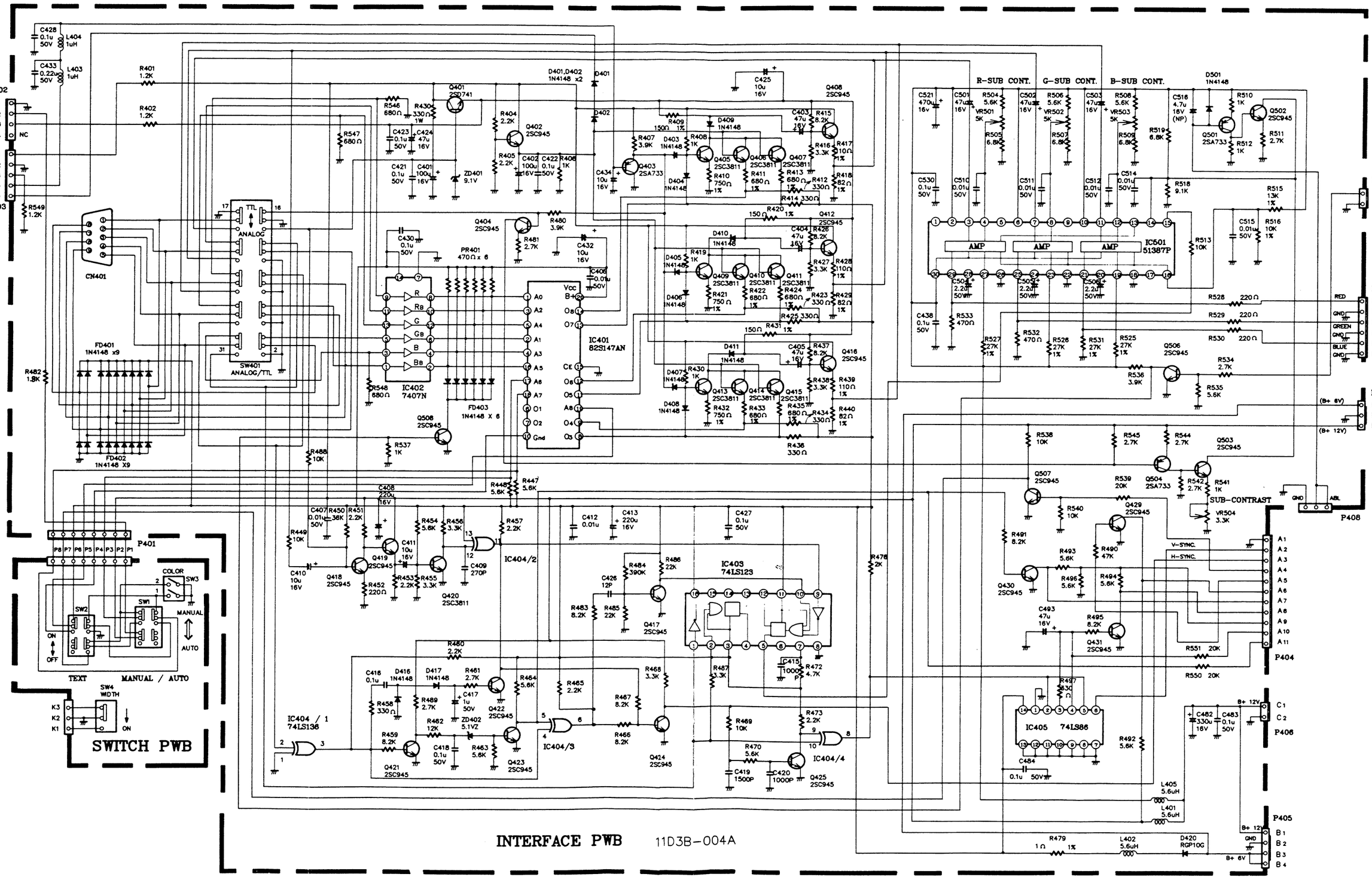


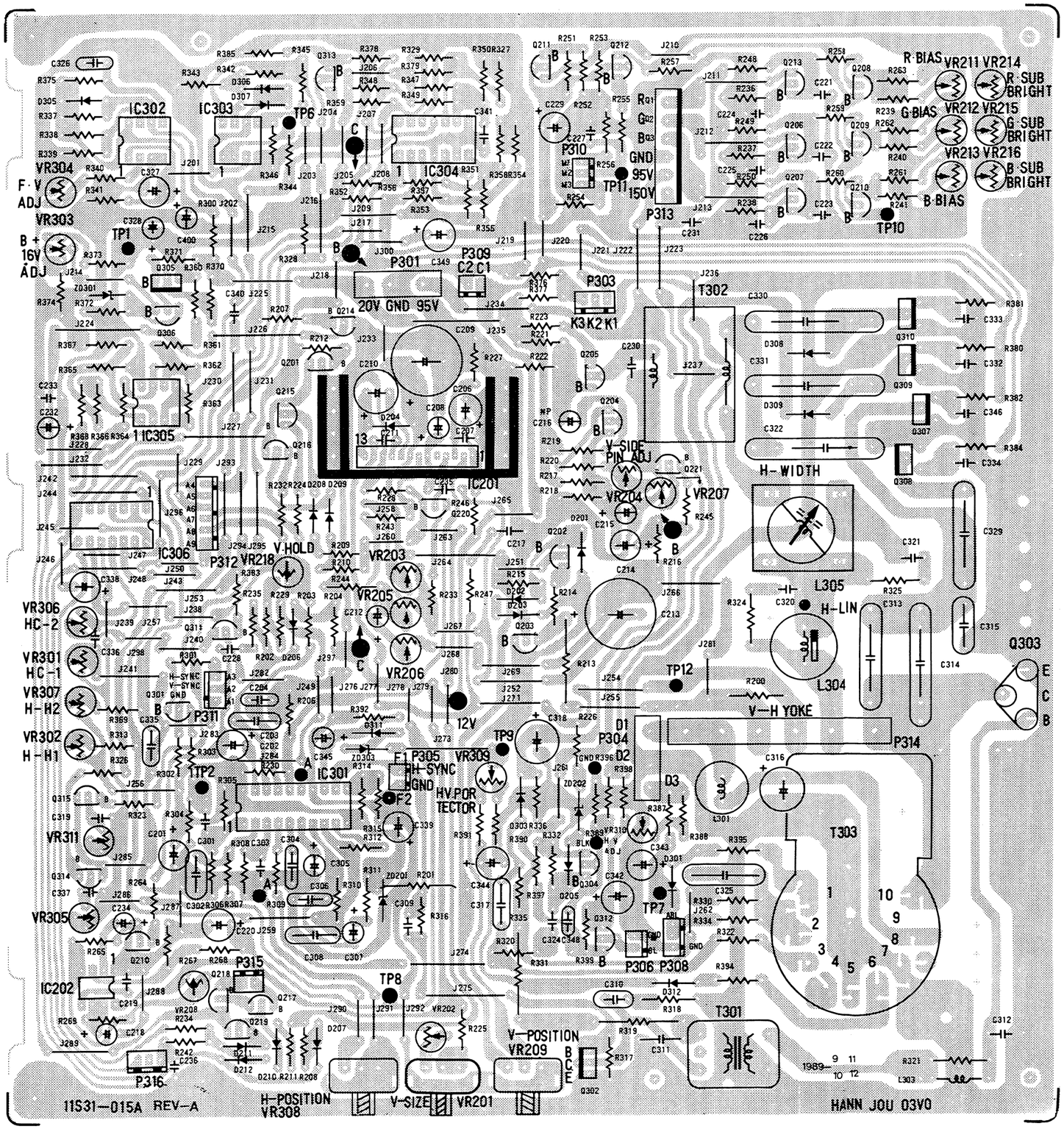


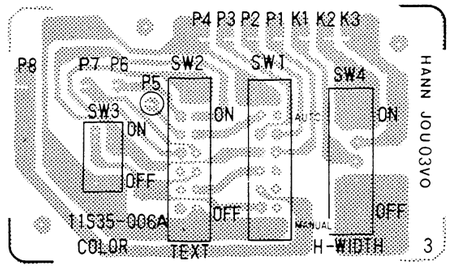
LED PCB

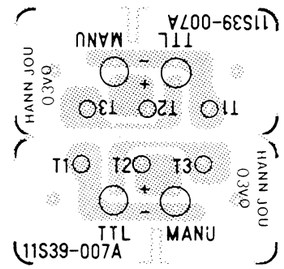

P101
F101 2.5A 250V
T101
R101 1.8Ω 5W
R143 1.8Ω 5W
R144 1.8Ω 5W
R100 220K
C101 0.22u 250V
C102 0.22u 250V
C103 2200P 400V
C104 2200P 400V
BD101 RS205
C105 470u 200V
C106 470u 200V
R102 220K 1/2W
R103 220K 1/2W
P103
110V 220V
SW101
AC FILTER
PR101
P102
C107 1000P 1600V (PMP)
Q101 2SC3469
HS-1
R104 56Ω/2W
R108 1K
R109 1.5K
C109 0.047u 50V (PEI)
ZD101 12VZ
D103 RGP10G
R105 15Ω
R107 1K
R106 330Ω
C108 0.22u 50V (MER)
C110 0.22u 50V (MER)
Q102 TIP31C
R111 100Ω
C111 2.2u 50V
R110 1.5Ω 2W
T102
R114 6.8Ω 5W
HS-2
IC102 7805
IC103 7812
D104 SB430
C112 1000u 16V
R113 100Ω
VR103 200Ω 5V ADJ.
R112 270Ω
C113 330u 16V
D105 RGP10G
C114 330u 25V
C115 330u 25V
D106 RGP10G
L101 47uH
C116 470u 35V
C117 470u 35V
D107 RGP10G
L102 47uH
C119 100u 160V
C120 100u 160V
D108 RGP10M
C118 100u 250V
R118 3.9K 2W
IC101 4N35
R119 10K 1/2W
Q103 2SC3478
R115 20K
R116 27K
R117 4.3K
D110 1N4148
D109 1N4148
D111 1N4148
ZD102 6.2VZ
12V
6V
20V
G
95V
R131 5.1K 2W
C127 2.2u 160V
R133 30K 2W
Q107 2SC3457
R132 10Ω
T103
HS-4
R140 18K 2W
C132 2.2u 250V
VR101 5K
C128 100u 160V
L104 5mH
D112 RGP10G
R142 8.2K 2W
R130 10K 1/2W
C125 470P 500V
R128 1.2K
C124 0.022u 50V (PEI)
Q106 2688K
D113 1N4004
R127 180Ω
SW. REG.PWB 11S32-010A
150V
B5V
G
B Q3
G Q2
R Q1
6V
G
12V
P601
SG801
R622 220Ω 1/2W
C622 0.01u 2KV
G1 G2 G4
SCREEN
FOCUS
H.V.
L604 5.6uH
C631 0.01u 500V
C619 10u 160V
R619 220K
C601 0.22u 250V (MPP)
C610 0.01u 500V
C613 1u 160V
R601 1.5K 5W
1N4148 D601
R607 2.2K
L601 6.8uH
ZS601 6.8VZ
Q604 2SC3502
C630 100u 16V
R613 100Ω
C607 0.1u 50V
Q601 2SC4367
KR
GR'
KG
GG'
KB
GB'
R604 100Ω
C604 330P 50V
R610 27Ω
L605 5.6uH
C620 0.1u 50V
R620 220K
C602 0.22u 250V (MPP)
C611 0.01u 500V
C614 1u 160V
R602 1.5K 5W
R623 220Ω 1/2W
1N4148 D602
R608 2.2K
L602 6.8uH
SG602 1.2KV
C608 0.1u 50V
Q605 2SC3502
Q602 2SC4367
R614 100Ω
1N4148 D604
1N4148 D605
L606 5.6uH
C605 330P 50V
R605 100Ω
R611 27Ω
R626 82Ω
R628 82Ω
C621 2200P 500V
BLANKING
GND
R627 82Ω
D606 1N4148
C612 0.01u 500V
C615 1u 160V
R603 1.5K 5W
R621 220K
C603 0.22u 250V (MPP)
D603 1N4148
R609 2.2K
L603 6.8uH
R624 220Ω 1/2W
SG603
Q606 2SC3502
R615 100Ω
C609 0.1u 50V
Q603 2SC4367
C606 330P 50V
R606 100Ω
R612 27Ω
CRT PWB
11S33-008D
A105 2SA1015
R123 10K
R124 150K
C122 1200P
R120 1M
C120 1000P
R125 120K
Q104 2SC945
R134 6.8K
R135 8.2K
R122 1K
R121 150K
R126 3.3K
R136 3.3K
P106
F1
F2
P107
D1
D2
D3
C129 0.001 50V
C130 0.068u 50V (PEI)
VR102 2K
R139 5.6K
Q108 2SC945
H.V. ADJ
D114 1N4148
R138 3.3K
ZD104 6.2VZ
C131 0.22u 250V (PEI)
R137 330Ω

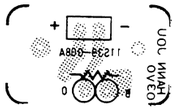

P312
P304
P301
P311
IC303 uPD4557C
IC305 uPD4557C
IC306 uPD4066BC
IC304 uPD399C
IC201 LM7837
IC201 LA7850
IC302 F/V IR9331
IC304 uPC339C
IC306 uPD4066BC
IC303 uPC4557C
IC202 HA17555
IC305
SW201 AUTO/MANUAL SW.
AUTO
MANUAL
P316
VR217 10K-B BRIGHT
POWER (GREEN) LED601
VR401 10K CONTRAST
TTL (GREEN) LED702
MANUAL (GREEN) LED701
V-Hold
H-Center (1)
H-Hold (1)
H-Center (2)
H-Hold (2)
F/Y Adj
B+ 16V Adj
V-Size
V-Sub Size
B-Position
V-Position
V-Protector adj
H.V. Adj
R-Sub Bright
G-Sub Bright
B-Sub Bright
R-Bias
G-Bias
B-Bias
P314
P313
P309
P310
P306
P308
P315
TP10
TP11
TP12
H.V.
FOCUS
SCREEN
BLK
GND
T303
T302
T301
L301 56uH
L303 2.7uH
L304 H-LIN
L305 H-WIDTH
F1 F2 P305
K1 K2 K3 P303

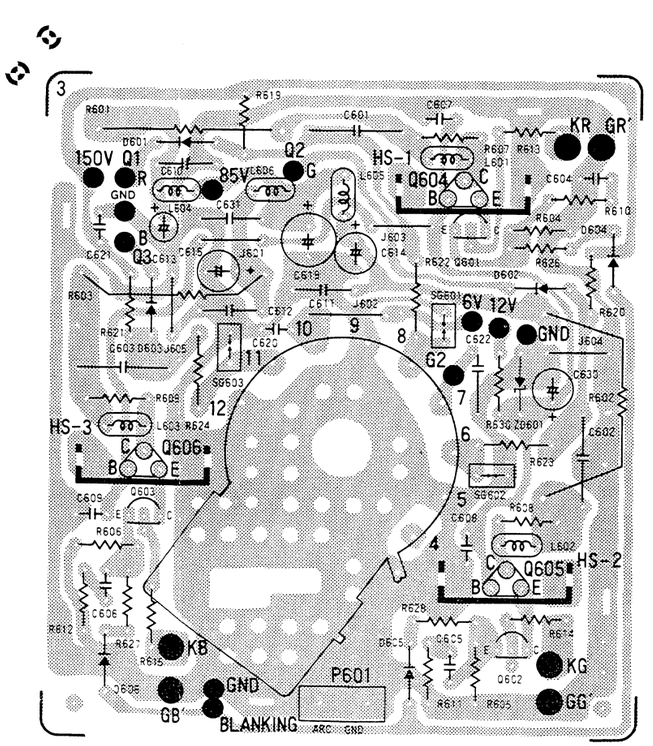

P402
T1
T2
T3
T4
NC
S1
S2
S3
S4
S5
P403
C428 0.1u 50V
L404 1uH
C433 0.22u 50V
L403 1uH
R401 1.2K
R402 1.2K
R549 1.2K
CN401
FD401 1N4148 x9
FD402 1N4148 X9
R482 1.8K
SW401 ANALOG/TTL
TTL
ANALOG
R546 680Ω
R430 330Ω 1W
Q401 2SD741
R547 680Ω
C423 0.1u 50V
C424 47u 16V
C421 0.1u 50V
C401 100u 16V
ZD401 9.1V
R404 2.2K
Q402 2SC945
R405 2.2K
C402 100u 16V
C422 0.1u 50V
R406 1K
D401,D402 1N4148 x2
D401
D402
C425 10u 16V
Q408 2SC945
R409 150Ω 1%
D409 1N4148
C403 47u 16V
R415 8.2K
R407 3.9K
D403 1N4148
R408 1K
R416 3.3K
R417 10Ω 1%
Q403 2SA733
C434 10u 16V
Q405 2SC3811
Q406 2SC3811
Q407 2SC3811
R410 750Ω 1%
R411 680Ω 1%
R413 1%
R412 330Ω
R418 82Ω 1%
D404 1N4148
R414 330Ω
Q404 2SC945
R480 3.9K
R481 2.7K
C432 10u 16V
C430 0.1u 50V
PR401 470Ω x 6
IC406 0.01u 50V
R420 150Ω 1%
Q412 2SC945
D410 1N4148
C404 47u 16V
R426 8.2K
R419 1K
D405 1N4148
Q409 2SC3811
Q410 2SC3811
Q411 2SC3811
R427 3.3K
R428 110Ω 1%
R421 750Ω 1%
R422 680Ω 1%
R424 680Ω 1%
R423 330Ω
R429 82Ω 1%
D406 1N4148
R425 330Ω
R431 150Ω 1%
D411 1N4148
C405 47u 16V
R437 8.2K
Q416 2SC945
D407 1N4148
R430 1K
Q413 2SC3811
Q414 2SC3811
Q415 2SC3811
R438 3.3K
R439 110Ω 1%
R432 750Ω 1%
R433 680Ω 1%
R435 680Ω 1%
R434 330Ω
R440 82Ω 1%
D408 1N4148
R436 330Ω
IC401 82S147AN
IC402 7407N
FD403 1N4148 X 6
Q508 2SC945
R537 1K
R488 10K
R548 680Ω
R447 5.6K
R448 5.6K
C408 220u 16V
C407 0.01u 50V
R450 38K
R451 2.2K
R449 10K
C410 10u 16V
Q418 2SC945
R452 220Ω
C411 10u 16V
Q419 2SC945
R453 2.2K
R454 5.6K
R455 3.3K
R456 3.3K
Q420 2SC3811
R457 2.2K
C409 270P
IC404/2
C412 0.01u
C413 220u 16V
C427 0.1u 50V
R476 2K
IC403 74LS123
R484 390K
R486 22K
C426 12P
R483 8.2K
R485 22K
Q417 2SC945
C415 1000P
R472 4.7K
R487 3.3K
R480 2.2K
C416 0.1u
D416 1N4148
D417 1N4148
R461 2.7K
R464 5.6K
R458 330Ω
R489 2.7K
C417 1u 50V
Q422 2SC945
R465 2.2K
R467 8.2K
R468 3.3K
R462 12K
ZD402 5.1VZ
R459 8.2K
C418 0.1u 50V
R463 5.6K
Q423 2SC945
IC404/3
R466 8.2K
Q424 2SC945
IC404 / 1 74LS136
R469 10K
R473 2.2K
R470 5.6K
C419 1500P
C420 1000P
Q425 2SC945
IC404/4
SW4 WIDTH
K3
K2
K1
ON
SWITCH PWB
P401
P8 P7 P6 P5 P4 P3 P2 P1
COLOR
SW3
SW1
SW2
MANUAL
AUTO
ON
OFF
TEXT
MANUAL / AUTO
R-SUB CONT.
G-SUB CONT.
B-SUB CONT.
D501 1N4148
C521 470u 16v
C501 47u 16V
R504 5.6K
VR501 5K
R505 6.8K
C502 47u 16V
R506 5.6K
VR502 5K
R507 6.8K
C503 47u 16V
R508 5.6K
VR503 5K
R509 6.8K
C516 4.7u 16V (NP)
R519 6.8K
Q501 2SA733
R510 1K
Q502 2SC945
R512 1K
R511 2.7K
C530 0.1u 50V
C510 0.01u 50V
C511 0.01u 50V
C512 0.01u 50V
C514 0.01u 50V
R518 9.1K
R515 13K 1%
C515 0.01u 50V
R516 10K 1%
IC501 51387P
AMP
AMP
AMP
R513 10K
C509 2.2u 50V
C508 2.2u 50V
C507 2.2u 50V
C438 0.1u 50V
R533 470Ω
R528 220Ω
R529 220Ω
R530 220Ω
R527 27K 1%
R532 470Ω
R526 27K 1%
R531 27K 1%
R525 27K 1%
Q506 2SC945
R536 3.9K
R534 2.7K
R535 5.6K
R538 10K
R545 2.7K
R544 2.7K
Q503 2SC945
Q507 2SC945
R539 20K
Q504 2SA733
R542 2.7K
R541 1K
SUB-CONTRAST
VR504 3.3K
R540 10K
Q429 2SC945
R491 8.2K
R493 5.6K
R490 47K
Q430 2SC945
R496 5.6K
R494 5.6K
V-SYNC.
H-SYNC.
C493 47u 16V
R495 8.2K
Q431 2SC945
R551 20K
R550 20K
R497 330Ω
IC405 74LS86
C484 0.1u 50V
R492 5.6K
C482 330u 16V
C483 0.1u 50V
L405 5.6uH
L401 5.6uH
R479 1Ω 1%
L402 5.6uH
D420 RGP10G
P410
BLK
GND
P407
H1
H2
H3
H4
H5
H6
RED
GND
GREEN
GND
BLUE
GND
P409
E1
E2
E3
(B+ 8V)
(B+ 12V)
P408
GND
ABL
P404
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
P406
C1
C2
B+ 12V
P405
B1
B2
B3
B4
B+ 12V
GND
B+ 6V
INTERFACE PWB
11D3B-004A

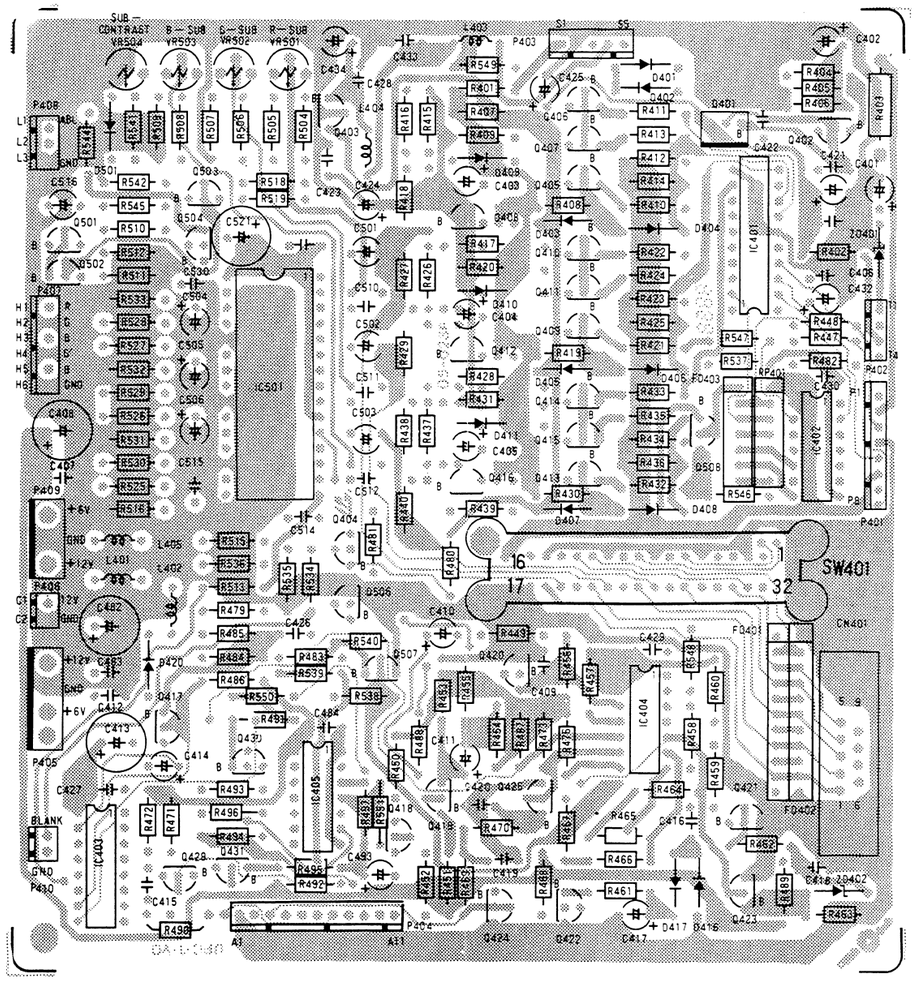

IC302
IC303
IC304
IC305
IC306
IC201
IC301
IC202
TP6
TP1
TP2
TP8
TP9
TP10
TP11
TP12
P301
P303
P309
P310
P313
P312
P311
P315
P316
P314
P305
P306 P308
T302
T303
T301
L305
L304
L303
VR304
F·V ADJ
VR303
B + 16V ADJ
VR306 HC-2
VR301 HC-1
VR307 H-H2
VR302 H-H1
VR311
VR305
VR218
VR203
VR205
VR206
VR309
VR310
VR204
VR207
VR208
VR202
VR201
VR308
VR209
R-BIAS
VR211 VR214
R SUB BRIGHT
G-BIAS
VR212 VR215
G SUB BRIGHT
B-BIAS
VR213 VR216
B SUB BRIGHT
V-SIDE PIN ADJ
H-WIDTH
V-H YOKE
V-POSITION
H-POSITION
V-SIZE
HV-PORTECTOR
20V GND 95V
GND 95V 150V
12V
11S31-015A REV-A
HANN JOU 03V0

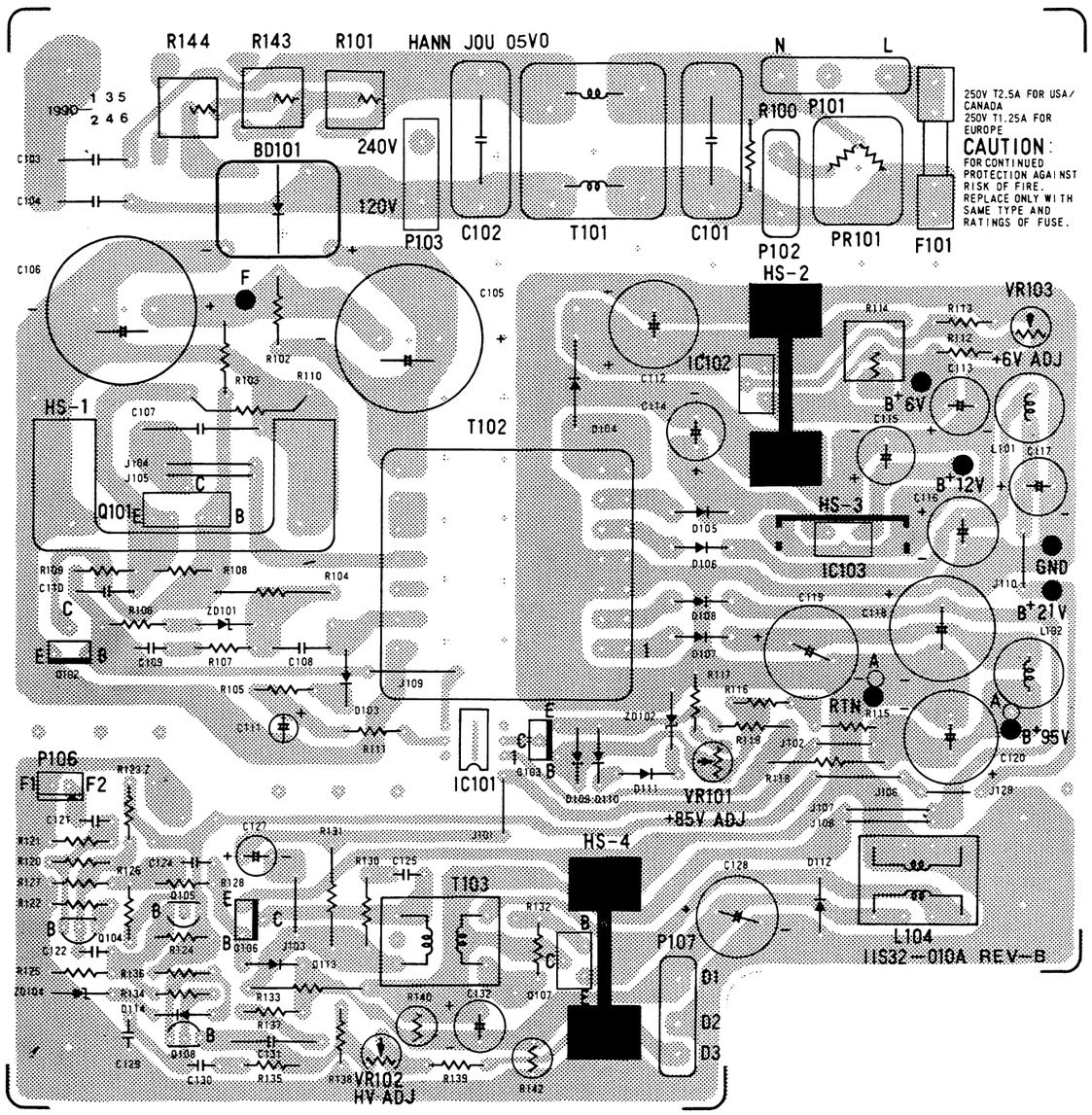

P4 P3 P2 P1 K1 K2 K3
P8 P7 P6 P5
SW2
SW1
SW4
SW3
ON
OFF
11S35-006A
COLOR
TEXT
H-WIDTH
HANN JOU03V0
3


11S39-007A
TTL MANU
T1 T2 T3
HANN JOU 03V0



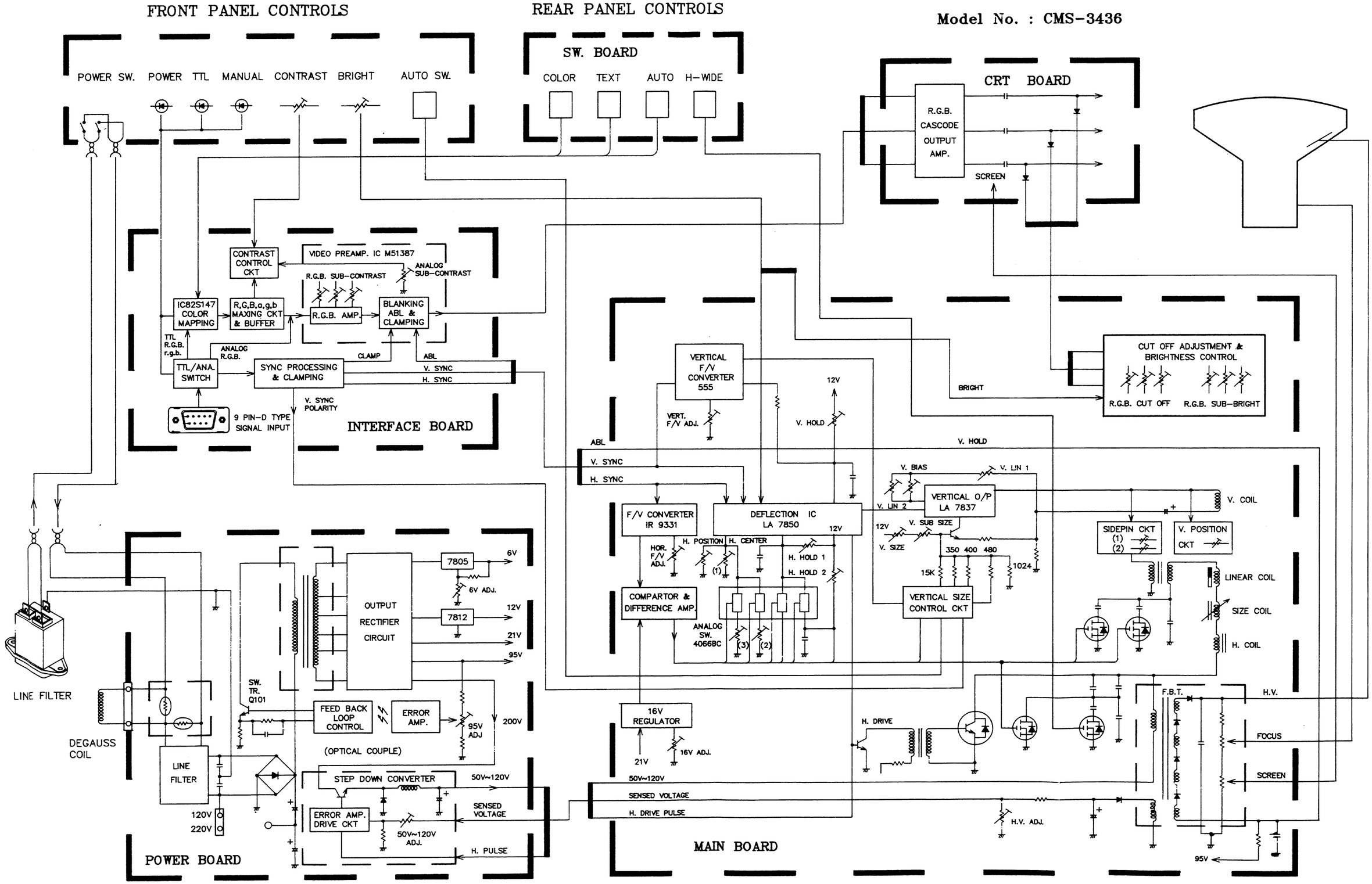

P601
Q601
Q602
Q603
Q604
Q605
Q606
HS-1
HS-2
HS-3
150V
85V
6V 12V
GND
KR
GR
KG
GG
KB
GB
BLANKING


SUB-CONTRAST VR504
B-SUB VR503
G-SUB VR502
R-SUB VR501
IC501
IC405
IC404
IC401
IC403
SW401
FD401
FD402
FD403
P408
P409
P405
P420
P430
P401
P403
P402
P404
P406
P407
BLANK
GND
+6V
+12V
16
17
32
1
A1
A11

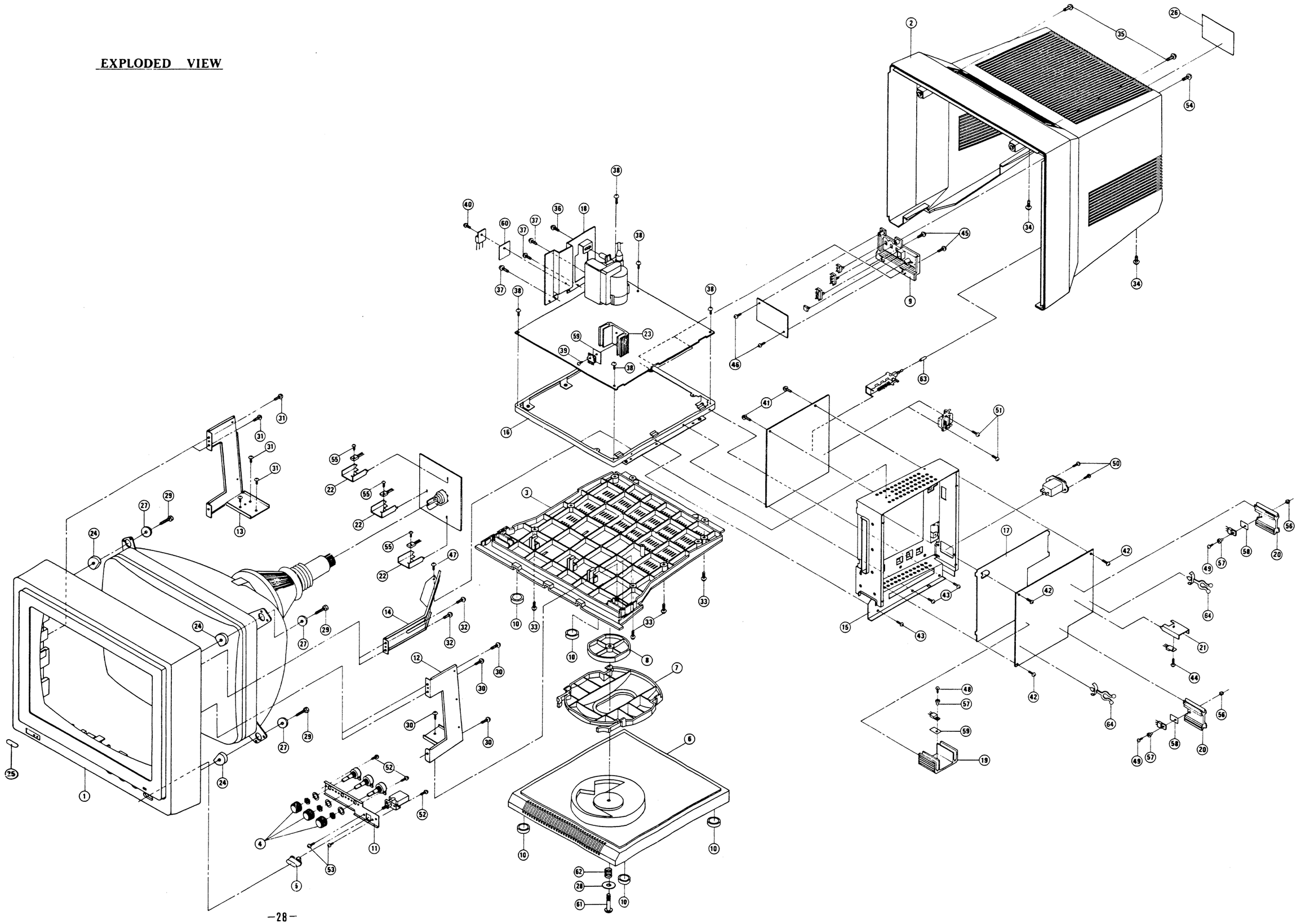

R144
R143
R101
HANN JOU 05V0
1990 1 3 5 2 4 6
BD101
240V
120V
P103
C102
T101
C101
N
L
R100
P101
P102
PR101
F101
250V T2.5A FOR USA/CANADA
250V T1.25A FOR EUROPE
CAUTION:
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE AND RATINGS OF FUSE.
HS-2
VR103
+6V ADJ
B+6V
B+12V
HS-3
IC102
IC103
GND
B+21V
B+95V
R1N
HS-1
T102
Q101
IC101
VR101
+85V ADJ
HS-4
T103
P106
F1
F2
P107
D1
D2
D3
L104
VR102
HV ADJ
IIS32-010A REV-B

BLOCK DIAGRAM

Model No. : CMS-3436



EXPLODED VIEW



MODEL CMS-3435/36 EXPLODED VIEW PARTS LIST

NO.	PARTS NUMBER	DESCRIPTION	Q'TY
01	0820009050	FRONT PANEL	1
02	0800008050	TOP CABINET	1
03	0800007050	BOTTOM CABINET	1
04	7114419030	VR KNOB	3
05	7114840050	POWER KNOB	1
06	0831092250	SWIVEL BASE	1
07	0811093250	SWIVEL BOWL	1
08	0813098000	SWIVEL DISK	1
09	0813127050	TERMINAL PLATE	1
10	7414425220	RUBBER FOOT	6
11	7623153000	VR BRACKET	1
12	7622049000	FIXING BRACKET (R)	1
13	7622050000	FIXING BRACKET (L)	1
14	7623133000	FIXING BRACKET	1
15	7621120000	POWER BRACKET	1
16	7601119003	PCB FRAME	1
17	7434919020	INSULATOR SHEET	1
18	7513135201	HEAT SINK	1
19	7514414200	HEAT SINK	1
20	7514929230	HEAT SINK	2
21	7514415000	HEAT SINK	1
22	7514795000	HEAT SINK	3
23	7515222200	HEAT SINK	1
24	7414617340	CRT SPACER	4
25	7144860000	NAME PLATE	1
26	7145226400	FCC OVERLAY	1
27	7464616450	WASHER	4
28	7464012450	WASHER	1
29	6774620140	TAPPING SCREW 4X36	4
30	6722440100	TAPPING SCREW 4X10	6
31	6722440100	TAPPING SCREW 4X10	6
32	6722440100	TAPPING SCREW 4X10	2

NO.	PARTS NUMBER	DESCRIPTION	Q'TY
33	6720440081	MACH.SCREW M4X8	6
34	6720140081	MACH.SCREW M4X8	2
35	6722440180	TAPPING SCREW M4X18	2
36	6722435080	TAPPING SCREW 3.5X8	1
37	6722430080	TAPPING SCREW 3X8	3
38	6722430080	TAPPING SCREW 3X8	5
39	6722430080	TAPPING SCREW 3X8	1
40	6722430100	TAPPING SCREW 3X10	1
41	6722430080	TAPPING SCREW 3X8	2
42	6722430080	TAPPING SCREW 3X8	4
43	6722430080	TAPPING SCREW 3X8	5
44	6722430080	TAPPING SCREW 3X8	1
45	6722430080	TAPPING SCREW 3X8	2
46	6722430100	TAPPING SCREW 3X10	2
47	6722430080	TAPPING SCREW 3X8	1
48	6722430080	TAPPING SCREW 3X8	1
49	6722430100	MACH.SCREW M3X10	2
50	6720130083	MACH.SCREW M3X8	2
51	6720430120	MACH.SCREW	2
52	6722430080	TAPPING SCREW 3X8	3
53	6720430060	MACH.SCREW M3X6	2
54	6720230081	TAPPING SCREW 3X8	1
55	6724426060	TAPPING SCREW 2.6X6	3
56	6740030240	NUT M3	2
57	7904451000	INSULATING SLEEVING	3
58	7414452000	SR. 18mmX13mm	2
59	7414567000	SR. 24.5mmX20mm	2
60	7414569000	SR. 18mmX20mm	1
61	6774783120	SPECIAL SCREW	1
62	7314784110	SPRING	1
63	7164502400	AL CAP	1
64	7904981000	CABLE CLIP	2

Replacement Parts List

Product Safety Note: Components marked with a "!" have special characteristics important to safety. Before replacing any of these components, read carefully the Product Safety Notice of this Service Manual.Don't degrade the safety of the monitor through improper servicing.

Abbreviations: Capacitors ..... EL: Electrolytic Aluminum, TA: Tantalum, CE: Ceramic
PP: Polypropylene, PE: Polyster, MPE: Polyster Metalized,
MPP: Polypropylene Metalized.
Resistors ..... CF: Carbon Film, MF: Metal Film, VR: Variable Resistor.
Semiconductor .....TR: Transistor, DI: Diode, ZD: Zener diode, IC: IC.

SYMBOL NO.	PART NO.	DESCRIPTION
TRANSISTORS		
! Q101	14C3P-030C	TR 2SC3459
! Q102	14D22-070H	TR TIP31C
! Q103	14C92-210B	TR 2SC3478
Q104	14C92-111B	TR 2SC945
Q105	14A92-021B	TR 2SA733P/Q
Q106	14C26-040B	TR 2SC2688K
! Q107	14C22-140C	TR 2SC3457L
Q108	14C92-111B	TR 2SC945
Q201	14A92-021B	TR 2SA733P/Q
Q202	14C92-101B	TR 2SC2001K
Q203	14A92-071B	TR 2SB605
Q204	14C92-111B	TR 2SC945
Q205	14B07-010B	TR 2SB605L
Q206	14A92-061D	TR 2SA1018Q/R
Q207	14A92-061D	TR 2SA1018Q/R
Q208	14C92-201D	TR 2SC1473Q/R
Q209	14C92-201D	TR 2SC1473Q/R
Q210	14C92-201D	TR 2SC1473Q/R
Q211	14C92-111B	TR 2SC945
Q212	14C92-111B	TR 2SC945
Q213	14A92-061D	TR 2SA1018Q/R
Q214	14C92-111B	TR 2SC945
Q215	14C92-111B	TR 2SC945
Q216	14C92-111B	TR 2SC945
Q217	14C92-111B	TR 2SC945
Q218	14C92-111B	TR 2SC945
Q219	14C92-111B	TR 2SC945
Q220	14C92-111B	TR 2SC945
Q221	14C92-111B	TR 2SC945
Q301	14C92-111B	TR 2SC945
Q302	14C26-040B	TR 2SC2688K
Q303	14C3P-030P	TR 2SC3883
Q304	14C92-111B	TR 2SC945
Q305	14D26-010B	TR 2SD882P/Q
Q306	14C92-111B	TR 2SC945
Q307	14K22-004P	TR FET YTF830
Q308	14K22-004P	TR FET YTF830
Q309	14K01-001P	TR FET 2SK430L(W/ACC)
Q310	14K01-001P	TR FET 2SK430L(W/ACC)
Q311	14A92-021B	TR 2SA733P/Q
Q312	14A92-021B	TR 2SA733P/Q
Q313	14C92-111B	TR 2SC945
Q314	14C92-111B	TR 2SC945
Q315	14C92-111B	TR 2SC945
Q401	14D94-010B	TR 2SD471L
Q402	14C92-111B	TR 2SC945
Q403	14A92-021B	TR 2SA733P/Q
Q404	14C92-111B	TR 2SC945
Q405	14C92-131D	TR 2SC3811
Q406	14C92-131D	TR 2SC3811
Q407	14C92-131D	TR 2SC3811
Q408	14C92-111B	TR 2SC945
Q409	14C92-131D	TR 2SC3811
Q410	14C92-131D	TR 2SC3811
Q411	14C92-131D	TR 2SC3811
Q412	14C92-111B	TR 2SC945
Q413	14C92-131D	TR 2SC3811
Q414	14C92-131D	TR 2SC3811
Q415	14C92-131D	TR 2SC3811
Q416	14C92-111B	TR 2SC945
Q417	14C92-111B	TR 2SC945
Q418	14C92-111B	TR 2SC945
Q419	14C92-111B	TR 2SC945
Q420	14C92-131D	TR 2SC3811
Q421	14C92-111B	TR 2SC945
Q422	14C92-111B	TR 2SC945
Q423	14C92-111B	TR 2SC945
Q424	14C92-111B	TR 2SC945
Q425	14C92-111B	TR 2SC945

SYMBOL NO.	PART NO.	DESCRIPTION
Q429	14C92-111B	TR 2SC945
Q430	14C92-111B	TR 2SC945
Q431	14C92-111B	TR 2SC945
Q501	14A92-021B	TR 2SA733P/Q
Q502	14C92-111B	TR 2SC945
Q503	14C92-111B	TR 2SC945
Q504	14A92-021B	TR 2SA733P/Q
Q506	14C92-111B	TR 2SC945
Q507	14C92-111B	TR 2SC945
Q508	14C92-111B	TR 2SC945
Q601	14C92-190P	TR 2SC4367
Q602	14C92-190P	TR 2SC4367
Q603	14C92-190P	TR 2SC4367
Q604	14C26-100C	TR 2SC3788
Q605	14C26-100C	TR 2SC3788
Q606	14C26-100C	TR 2SC3788
DIODES		
! D102	15S35T201F	DI RGP 10G
! D103	15S35T201F	DI RGP 10G
D105	15S35T201F	DI RGP 10G
D106	15S35T201F	DI RGP 10G
D107	15S35T201F	DI RGP 10G
D108	15S39T201F	DI RGP 10M
D109	15S11T001F	DI 1N4148
! D110	15S11T001F	DI 1N4148
! D111	15S11T001F	DI 1N4148
! D112	15S35T201F	DI RGP 10G
! D113	15S65T201F	DI 1N4004
! D114	15S11T001F	DI 1N4148
D201	15S11T001F	DI 1N4148
D202	15S11T001F	DI 1N4148
D203	15S11T001F	DI 1N4148
D204	15S35T201F	DI RGP 10G
D205	15S11T001F	DI 1N4148
D206	15S11T001F	DI 1N4148
D207	15S11T001F	DI 1N4148
D208	15S11T001F	DI 1N4148
D209	15S11T001F	DI 1N4148
D210	15S11T001F	DI 1N4148
D211	15S11T001F	DI 1N4148
D212	15S11T001F	DI 1N4148
D301	15S35T201F	DI RGP 10G
D303	15S35T201F	DI RGP 10G
D305	15S11T001F	DI 1N4148
D306	15S11T001F	DI 1N4148
D307	15S11T001F	DI 1N4148
D308	15S35T201F	DI RGP 10G
D309	15S35T201F	DI RGP 10G
D311	15S11T001F	DI 1N4148
D312	15S35T201F	DI RGP 10G
D401	15S11T001F	DI 1N4148
D402	15S11T001F	DI 1N4148
D403	15S11T001F	DI 1N4148
D404	15S11T001F	DI 1N4148
D405	15S11T001F	DI 1N4148
D406	15S11T001F	DI 1N4148
D407	15S11T001F	DI 1N4148
D408	15S11T001F	DI 1N4148
D409	15S11T001F	DI 1N4148
D410	15S11T001F	DI 1N4148
D411	15S11T001F	DI 1N4148
D416	15S11T001F	DI 1N4148
D417	15S11T001F	DI 1N4148
D420	15S35T201F	DI RGP 10G
D501	15S11T001F	DI 1N4148
D601	15S11T001F	DI 1N4148
D602	15S11T001F	DI 1N4148
D603	15S11T001F	DI 1N4148
D604	15S11T001F	DI 1N4148
D605	15S11T001F	DI 1N4148
D606	15S11T001F	DI 1N4148
ZENER DIOEDS		
! ZD101	15Z33T1200	ZD HZ 12A1/2
! ZD102	15Z33T6290	ZD HZ 6C2/3T
! ZD104	15Z33T6290	ZD HZ 6C2/3T
ZD201	15Z33T1200	ZD HZ 12A1/2
ZD202	15Z33T1200	ZD HZ 12A1/2
ZD301	15Z33T8290	ZD HZ 9A2
ZD303	15Z33T8290	ZD HZ 9A2
ZD401	15Z33T9190	ZD HZ 9C1/2T
ZD402	15Z33T5190	ZD HZ 5C1/2T
ZD601	15Z33T6890	ZD HZ 7B1TA
INTEGRATED CIRCUITS		
! IC101	17B21-040E	IC 4N35
IC102	17A07-040H	IC L7805C
IC103	17A07-010H	IC HA17812
! IC201	17A06-110H	IC LA7837
IC202	17A08-030H	IC HA17555

SYMBOL NO.	PART NO.	DESCRIPTION
! IC301	17A06-080H	IC LA7850
! IC302	17A08-010H	IC IR9331
IC303	17A11-020H	IC UPC4557C
IC304	17A11-010H	IC LM339N
IC305	17A11-020H	IC UPC4557C
IC306	16L14-001B	IC 4066BC
IC401	16M20-001R	IC PROM 82S147A
IC402	16G14-004R	IC 7407N
IC403	16A16-001P	IC 74LS123
IC404	16G14-005R	IC 74LS136
IC405	16G14-006R	IC 74LS86
IC501	17A04-020H	IC M51387P

RESISTORS

! R100	22225-2241	CF	220K	5%	1/4W
! R101	24665-1891	MF	1R8	5%	5W
R102	22245-2241	CF	220K	5%	1/2W
R103	22245-2241	CF	220K	5%	1/2W
! R104	23255-5605	MF	56R	5%	2W
! R105	22225-1501	CF	15R	5%	1/4W
! R106	22225-3311	CF	330R	5%	1/4W
! R107	22225-1021	CF	1K	5%	1/4W
R108	22225-1021	CF	1K	5%	1/4W
! R109	22225-1521	CF	1K5	5%	1/4W
! R110	23255-1595	MF	1R5	5%	2W
! R111	22225-1011	CF	100R	5%	1/4W
! R112	22225-2711	CF	270R	5%	1/4W
! R113	22225-1011	CF	100R	5%	1/4W
R114	24665-5691	MF	5R6	5%	5W
! R115	22225-2031	CF	20K	5%	1/4W
! R116	22225-2731	CF	27K	5%	1/4W
! R117	22225-4321	CF	4K3	5%	1/4W
! R118	23255-3925	MF	3K9	5%	2W
! R119	22245-1031	CF	10K	5%	1/2W
R120	22225-1051	CF	1M	5%	1/4W
R121	22225-1541	CF	150K	5%	1/4W
R122	22225-1021	CF	1K	5%	1/4W
R123	22225-1031	CF	10K	5%	1/4W
! R124	22225-1541	CF	150K	5%	1/4W
! R125	22225-1241	CF	120K	5%	1/4W
! R126	22225-1521	CF	1K5	5%	1/4W
! R127	22225-1811	CF	180R	5%	1/4W
R128	22225-1221	CF	1K2	5%	1/4W
R130	22245-1031	CF	10K	5%	1/2W
R131	23255-5125	MF	5K1	5%	2W

SYMBOL NO.	PART NO.	DESCRIPTION
R132	22225-1001	CF 10R 5% 1/4W
! R133	23255-3035	MF 30K 5% 2W
! R134	22225-6821	CF 6K8 5% 1/4W
! R135	22225-8221	CF 8K2 5% 1/4W
R136	22225-3321	CF 3K3 5% 1/4W
R137	22225-3311	CF 330R 5% 1/4W
! R138	22225-3321	CF 3K3 5% 1/4W
! R139	22225-5621	CF 5K6 5% 1/4W
! R140	23255-183A	MF 18K 5% 2W
R142	23255-822A	MF 8K2 5% 2W
! R143	24665-1891	MF 1R8 5% 5W
! R144	24665-1891	MF 1R8 5% 5W
R200	22245-1211	CF 120R 5% 1/2W
R201	23255-1515	MF 150R 5% 2W
R202	22225-1841	CF 180K 5% 1/4W
R203	22225-6831	CF 68K 5% 1/4W
R204	22225-3341	CF 330K 5% 1/4W
R206	22225-1531	CF 15K 5% 1/4W
R207	22225-3031	CF 30K 5% 1/4W
! R208	23A21-1831	MF 18K 1% 1/4W
! R209	23A21-6131	MF 61K 1% 1/4W
! R210	23A21-1531	MF 15K 1% 1/4W
! R211	23A21-5621	MF 5K6 1% 1/4W
R212	22225-3031	CF 30K 5% 1/4W
R213	23255-1215	MF 120R 5% 2W
R214	22225-2201	CF 22R 5% 1/4W
R215	22225-3331	CF 33K 5% 1/4W
R216	22225-1031	CF 10K 5% 1/4W
R217	22225-1041	CF 100K 5% 1/4W
! R218	22225-8221	CF 8K2 5% 1/4W
R219	22245-1021	CF 1K 5% 1/2W
R220	22225-4701	CF 47R 5% 1/4W
R221	22225-5621	CF 5K6 5% 1/4W
R222	22225-2231	CF 22K 5% 1/4W
R223	22225-1311	CF 130R 5% 1/4W
R224	22225-1031	CF 10K 5% 1/4W
R225	22225-4721	CF 4K7 5% 1/4W
R226	22225-2011	CF 200R 5% 1/4W
R227	22225-6831	CF 68K 5% 1/4W
! R228	23A21-5621	MF 5K6 1% 1/4W
R229	22225-8241	CF 820K 5% 1/4W
R230	22225-2231	CF 22K 5% 1/4W
R232	22225-1031	CF 10K 5% 1/4W
R233	22225-1831	CF 18K 5% 1/4W
R234	22225-2031	CF 20K 5% 1/4W
R235	22225-1021	CF 1K 5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION				SYMBOL NO.	PART NO.	DESCRIPTION			
R236	22225-3331	CF	33K	5%	1/4W	! R315	23A21-1231	MF	12K	1%	1/4W
R237	22225-3331	CF	33K	5%	1/4W	R316	22225-1021	CF	1K	5%	1/4W
R238	22225-3331	CF	33K	5%	1/4W	R317	22225-4711	CF	470R	5%	1/4W
R239	22225-3331	CF	33K	5%	1/4W	R318	22245-4721	CF	4K7	5%	1/2W
R240	22225-3331	CF	33K	5%	1/4W	R319	23255-8215	MF	820R	5%	2W
R241	22225-3331	CF	33K	5%	1/4W	R320	23255-8215	MF	820R	5%	2W
R242	22225-2031	CF	20K	5%	1/4W	R321	22245-8291	CF	8R2	5%	1/2W
R243	22225-1011	CF	100R	5%	1/4W	R322	22225-4791	CF	4R7	5%	1/4W
R244	23745-1293	MF	1R2	5%	1W	R323	22225-3031	CF	30K	5%	1/4W
R245	22225-3031	CF	30K	5%	1/4W	R324	22245-4711	CF	470R	5%	1/2W
R246	22225-1011	CF	100R	5%	1/4W	R325	22245-3311	CF	330R	5%	1/2W
R247	22245-4791	CF	4R7	5%	1/2W	R326	22225-3031	CF	30K	5%	1/4W
R248	22225-2741	CF	270K	5%	1/4W	R327	22225-1541	CF	150K	5%	1/4W
R249	22225-2741	CF	270K	5%	1/4W	R328	22225-1531	CF	15K	5%	1/4W
R250	22225-2741	CF	270K	5%	1/4W	R329	22225-4751	CF	47M	5%	1/4W
R251	22225-1031	CF	10K	5%	1/4W	R330	22225-2241	CF	220K	5%	1/4W
R252	22225-1231	CF	12K	5%	1/4W	R331	22225-1031	CF	10K	5%	1/4W
R253	22225-3321	CF	3K3	5%	1/4W	R332	22225-1521	CF	1K5	5%	1/4W
R254	22225-6821	CF	6K8	5%	1/4W	R334	22225-1021	CF	1K	5%	1/4W
R255	22225-1021	CF	1K	5%	1/4W	R335	22225-1031	CF	10K	5%	1/4W
R256	22225-3321	CF	3K3	5%	1/4W	R336	22225-1051	CF	1M	5%	1/4W
R257	22225-2221	CF	2K2	5%	1/4W	R337	22225-1031	CF	10K	5%	1/4W
R258	22225-1841	CF	180K	5%	1/4W	R338	22225-1031	CF	10K	5%	1/4W
R259	22225-1841	CF	180K	5%	1/4W	R339	22225-1241	CF	120K	5%	1/4W
R260	22225-1841	CF	180K	5%	1/4W	R340	22225-4721	CF	4K7	5%	1/4W
R261	22225-6831	CF	68K	5%	1/4W	R341	22225-8231	CF	82K	5%	1/4W
R262	22225-6831	CF	68K	5%	1/4W	R342	22225-3921	CF	3K9	5%	1/4W
R263	22225-6831	CF	68K	5%	1/4W	R343	22225-2731	CF	27K	5%	1/4W
R264	22225-2031	CF	20K	5%	1/4W	R344	22225-1031	CF	10K	5%	1/4W
R265	22225-1031	CF	10K	5%	1/4W	! R345	23A21-1331	MF	13K	1%	1/4W
R268	22225-1021	CF	1K	5%	1/4W	! R346	23A21-6821	MF	6K8	1%	1/4W
! R269	23A21-1031	MF	10K	1%	1/4W	! R347	23A21-1241	MF	120K	1%	1/4W
R301	22225-1021	CF	1K	5%	1/4W	R348	22225-1531	CF	15K	5%	1/4W
R302	22225-6821	CF	6K8	5%	1/4W	R349	22225-4751	CF	47M	5%	1/4W
R303	22225-1221	CF	1K2	5%	1/4W	! R350	23A21-2041	MF	200K	1%	1/4W
R304	22225-3921	CF	3K9	5%	1/4W	! R351	23A21-1241	MF	120K	1%	1/4W
R305	22225-2231	CF	22K	5%	1/4W	R352	22225-3021	CF	3K	5%	1/4W
R306	22225-1231	CF	12K	5%	1/4W	R353	22225-4751	CF	47M	5%	1/4W
R307	22225-4711	CF	470R	5%	1/4W	! R354	23A21-1241	MF	120K	1%	1/4W
R308	22225-2231	CF	22K	5%	1/4W	! R355	23A21-1341	MF	130K	1%	1/4W
R309	22225-8231	CF	82K	5%	1/4W	R356	22225-4721	CF	4K7	5%	1/4W
R310	22225-3331	CF	33K	5%	1/4W	R357	22225-4751	CF	47M	5%	1/4W
R311	22225-8221	CF	8K2	5%	1/4W	! R358	23A21-2741	MF	270K	1%	1/4W
R312	22225-1021	CF	1K	5%	1/4W	R359	22225-4721	CF	4K7	5%	1/4W
R313	22225-1231	CF	12K	5%	1/4W	R360	22225-5611	CF	560R	5%	1/4W
! R314	23A21-1231	MF	12K	1%	1/4W	! R361	23A21-6831	MF	68K	1%	1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
! R362	23A21-1241	MF 120K 1% 1/4W
! R363	23A21-2741	MF 270K 1% 1/4W
! R364	23A21-6831	MF 68K 1% 1/4W
R365	23A21-1041	MF 100K 1% 1/4W
! R366	23A21-1041	MF 100K 1% 1/4W
! R367	23A21-1041	MF 100K 1% 1/4W
! R368	23A21-4731	MF 47K 1% 1/4W
R369	22225-7531	CF 75K 5% 1/4W
R370	22225-4791	CF 4R7 5% 1/4W
R371	22225-2221	CF 2K2 5% 1/4W
R372	22225-2221	CF 2K2 5% 1/4W
R373	22225-5621	CF 5K6 5% 1/4W
R374	22225-6821	CF 6K8 5% 1/4W
R375	22225-1031	CF 10K 5% 1/4W
R376	22225-4731	CF 47K 5% 1/4W
R377	22225-2731	CF 27K 5% 1/4W
R378	22225-4731	CF 47K 5% 1/4W
! R379	23A21-1341	MF 130K 1% 1/4W
R380	22225-1041	CF 100K 5% 1/4W
R381	22225-1041	CF 100K 5% 1/4W
R382	22225-1041	CF 100K 5% 1/4W
R383	22225-2031	CF 20K 5% 1/4W
R384	22225-1041	CF 100K 5% 1/4W
R385	22225-5621	CF 5K6 5% 1/4W
! R387	22225-1821	CF 1K8 5% 1/4W
! R388	22225-1031	CF 10K 5% 1/4W
R389	22225-2721	CF 2K7 5% 1/4W
! R390	22225-3921	CF 3K9 5% 1/4W
! R391	22225-1231	CF 12K 5% 1/4W
R392	22225-1031	CF 10K 5% 1/4W
R394	22225-2291	CF 2R2 5% 1/4W
R395	22225-2291	CF 2R2 5% 1/4W
R396	22225-1821	CF 1K8 5% 1/4W
R397	22225-3321	CF 3K3 5% 1/4W
R398	22225-2211	CF 220R 5% 1/4W
R399	22225-1831	CF 18K 5% 1/4W
R401	22225-1221	CF 1K2 5% 1/4W
R402	22225-1221	CF 1K2 5% 1/4W
R403	23245-3314	MF 330R 5% 1W
R404	22225-2221	CF 2K2 5% 1/4W
R405	22225-2221	CF 2K2 5% 1/4W
R406	22225-1021	CF 1K 5% 1/4W
R407	22225-3921	CF 3K9 5% 1/4W
R408	22225-1021	CF 1K 5% 1/4W
R409	23A21-1511	MF 150R 1% 1/4W
R410	23A21-7511	MF 750R 1% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION
R411	23A21-6811	MF 680R 1% 1/4W
R412	22225-3311	CF 330R 5% 1/4W
R413	23A21-6811	MF 680R 1% 1/4W
R414	22225-3311	CF 330R 5% 1/4W
R415	22225-8221	CF 8K2 5% 1/4W
R416	22225-3321	CF 3K3 5% 1/4W
R417	23A21-1111	MF 110R 1% 1/4W
R418	23A21-8201	MF 82R 1% 1/4W
R419	22225-1021	CF 1K 5% 1/4W
R420	23A21-1511	MF 150R 1% 1/4W
R421	23A21-7511	MF 750R 1% 1/4W
R422	23A21-6811	MF 680R 1% 1/4W
R423	22225-3311	CF 330R 5% 1/4W
R424	23A21-6811	MF 680R 1% 1/4W
R425	22225-3311	CF 330R 5% 1/4W
R426	22225-8221	CF 8K2 5% 1/4W
R427	22225-3321	CF 3K3 5% 1/4W
R428	23A21-1111	MF 110R 1% 1/4W
R429	23A21-8201	MF 82R 1% 1/4W
R430	22225-1021	CF 1K 5% 1/4W
R431	23A21-1511	MF 150R 1% 1/4W
R432	23A21-7511	MF 750R 1% 1/4W
R433	23A21-6811	MF 680R 1% 1/4W
R434	22225-3311	CF 330R 5% 1/4W
R435	23A21-6811	MF 680R 1% 1/4W
R436	22225-3311	CF 330R 5% 1/4W
R437	22225-8221	CF 8K2 5% 1/4W
R438	22225-3321	CF 3K3 5% 1/4W
R439	23A21-1111	MF 110R 1% 1/4W
R440	23A21-8201	MF 82R 1% 1/4W
R447	22225-5621	CF 5K6 5% 1/4W
R448	22225-5621	CF 5K6 5% 1/4W
R449	22225-1031	CF 10K 5% 1/4W
R450	22225-3631	CF 36K 5% 1/4W
R451	22225-2221	CF 2K2 5% 1/4W
R452	22225-2211	CF 220R 5% 1/4W
R453	22225-2221	CF 2K2 5% 1/4W
R454	22225-5621	CF 5K6 5% 1/4W
R455	22225-3321	CF 3K3 5% 1/4W
R456	22225-3321	CF 3K3 5% 1/4W
R457	22225-2221	CF 2K2 5% 1/4W
R458	22225-3311	CF 330R 5% 1/4W
R459	22225-8221	CF 8K2 5% 1/4W
R460	22225-2221	CF 2K2 5% 1/4W
R461	22225-2721	CF 2K7 5% 1/4W
R462	22225-1231	CF 12K 5% 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION	SYMBOL NO.	PART NO.	DESCRIPTION
R463	22225-5621	CF 5K6 5% 1/4W	R526	23A21-2731	MF 27K 1% 1/4W
R464	22225-5621	CF 5K6 5% 1/4W	R527	23A21-2731	MF 27K 1% 1/4W
R465	22225-2221	CF 2K2 5% 1/4W	R528	22225-2211	CF 220R 5% 1/4W
R466	22225-8221	CF 8K2 5% 1/4W	R529	22225-2211	CF 220R 5% 1/4W
R467	22225-8221	CF 8K2 5% 1/4W	R530	22225-2211	CF 220R 5% 1/4W
R468	22225-3321	CF 3K3 5% 1/4W	R531	22225-4711	CF 470R 5% 1/4W
R469	22225-1031	CF 10K 5% 1/4W	R532	22225-4711	CF 470R 5% 1/4W
R470	22225-5621	CF 5K6 5% 1/4W	R533	22225-4711	CF 470R 5% 1/4W
R471	22225-4731	CF 47K 5% 1/4W	R534	22225-2721	CF 2K7 5% 1/4W
R472	22225-4721	CF 4K7 5% 1/4W	R535	22225-5621	CF 5K6 5% 1/4W
R473	22225-2221	CF 2K2 5% 1/4W	R536	22225-3921	CF 3K9 5% 1/4W
R476	22225-2021	CF 2K 5% 1/4W	R537	22225-1021	CF 1K 5% 1/4W
R479	23A21-1091	MF 1R 1% 1/4W	R538	22225-1031	CF 10K 5% 1/4W
R480	22225-3921	CF 3K9 5% 1/4W	R539	22225-2031	CF 20K 5% 1/4W
R481	22225-2721	CF 2K7 5% 1/4W	R540	22225-1031	CF 10K 5% 1/4W
R482	22225-1821	CF 1K8 5% 1/4W	R541	22225-1021	CF 1K 5% 1/4W
R483	22225-8221	CF 8K2 5% 1/4W	R542	22225-2721	CF 2K7 5% 1/4W
R484	22225-3941	CF 390K 5% 1/4W	R544	22225-2721	CF 2K7 5% 1/4W
R485	22225-2231	CF 22K 5% 1/4W	R545	22225-2721	CF 2K7 5% 1/4W
R486	22225-2231	CF 22K 5% 1/4W	R546	22225-6811	CF 680R 5% 1/4W
R487	22225-3321	CF 3K3 5% 1/4W	R547	22225-6811	CF 680R 5% 1/4W
R488	22225-1031	CF 10K 5% 1/4W	R548	22225-6811	CF 680R 5% 1/4W
R489	22225-2721	CF 2K7 5% 1/4W	R549	22225-1221	CF 1K2 5% 1/4W
R490	22225-4731	CF 47K 5% 1/4W	R550	22225-2031	CF 20K 5% 1/4W
R491	22225-8221	CF 8K2 5% 1/4W	R551	22225-2031	CF 20K 5% 1/4W
R492	22225-5621	CF 5K6 5% 1/4W	R601	23785-1527	MF 1K5 5% 5W
R493	22225-5621	CF 5K6 5% 1/4W	R602	23785-1527	MF 1K5 5% 5W
R494	22225-5621	CF 5K6 5% 1/4W	R603	23785-1527	MF 1K5 5% 5W
R495	22225-8221	CF 8K2 5% 1/4W	R604	22225-1011	CF 100R 5% 1/4W
R496	22225-5621	CF 5K6 5% 1/4W	R605	22225-1011	CF 100R 5% 1/4W
R497	22225-3311	CF 330R 5% 1/4W	R606	22225-1011	CF 100R 5% 1/4W
R504	22225-5621	CF 5K6 5% 1/4W	R607	22225-2221	CF 2K2 5% 1/4W
R505	22225-6821	CF 6K8 5% 1/4W	R608	22225-2221	CF 2K2 5% 1/4W
R506	22225-5621	CF 5K6 5% 1/4W	R609	22225-2221	CF 2K2 5% 1/4W
R507	22225-6821	CF 6K8 5% 1/4W	R610	22225-2701	CF 27R 5% 1/4W
R508	22225-5621	CF 5K6 5% 1/4W	R611	22225-2701	CF 27R 5% 1/4W
R509	22225-6821	CF 6K8 5% 1/4W	R612	22225-2701	CF 27R 5% 1/4W
R510	22225-1021	CF 1K 5% 1/4W	R613	22225-1011	CF 100R 5% 1/4W
R511	22225-2721	CF 2K7 5% 1/4W	R614	22225-1011	CF 100R 5% 1/4W
R512	22225-1021	CF 1K 5% 1/4W	R615	22225-1011	CF 100R 5% 1/4W
R513	22225-1031	CF 10K 5% 1/4W	R619	22225-2241	CF 220K 5% 1/4W
R515	23A21-1331	MF 13K 1% 1/4W	R620	22225-2241	CF 220K 5% 1/4W
R516	23A21-1031	MF 10K 1% 1/4W	R621	22225-2241	CF 220K 5% 1/4W
R518	22225-9121	CF 9K1 5% 1/4W	R622	22245-2211	CF 220R 5% 1/2W
R519	22225-2721	CF 2K7 5% 1/4W	R623	22245-2211	CF 220R 5% 1/2W
R525	23A21-2731	MF 27K 1% 1/4W	R624	22245-2211	CF 220R 5% 1/2W

SYMBOL NO.	PART NO.	DESTCRIPTION
R626	22225-8201	CF 82R 5% 1/4W
R627	22225-8201	CF 82R 5% 1/4W
R628	22225-8201	CF 82R 5% 1/4W
R630	22225-3311	CF 330R 5% 1/4W
	VARIABLE RESISTOR	
! VR101	25B22-501B	VR 500RB
! VR102	25B22-202B	VR 2KB
! VR103	25B22-201B	VR 200RB
! VR201	25C0A-103B	VR 10KB
! VR202	25B22-203B	VR 20KB
! VR203	25B22-254B	VR 250KB
! VR204	25B22-501B	VR 500RB
! VR205	25B22-203B	VR 20KB
! VR206	25B22-204B	VR 200KB
! VR207	25B22-102B	VR 1KB
! VR208	25B22-502B	VR 5KB
! VR209	25C0A-203B	VR 20KB
! VR211	25B22-104B	VR 100KB
! VR212	25B22-104B	VR 100KB
! VR213	25B22-104B	VR 100KB
! VR214	25B22-104B	VR 100KB
! VR215	25B22-104B	VR 100KB
! VR216	25B22-104B	VR 100KB
! VR217	25E51-103B	VR 10KB
! VR218	25B22-204B	VR 200K
! VR301	25A02-503B	VR 50KB
! VR302	25A02-502B	VR 5KB
! VR303	25A02-102B	VR 1KB
! VR304	25A02-332B	VR 3.3KB
! VR305	25A02-502B	VR 5KB
! VR306	25A02-502B	VR 5KB
! VR307	25A02-503B	VR 50KB
! VR308	25C0A-103B	VR 10KB
! VR309	25B22-202B	VR 2KB
! VR310	25B22-103B	VR 10KB
! VR311	25A02-502B	VR 5KB
! VR401	25E51-103B	VR 10KB
! VR501	25A02-502B	VR 5KB
! VR502	25A02-502B	VR 5KB
! VR503	25A02-502B	VR 5KB
! VR504	25A02-332B	VR 3.3KB
	CAPACITOR	

SYMBOL NO.	PART NO.	DESCRIPTION
! C101	42A27-224A	0.22uF AC250V20%
! C102	42A27-224A	0.22uF AC250V20%
! C103	42D57-222D	2200pF AC400V20%
! C104	42D57-222D	2200pF AC400V20%
! C105	28FA8-4716	EL 470uF 200V 50%/-10%
! C106	28FA8-4716	EL 470uF 200V 50%/-10%
C107	351A5-1027	MPP 1000pF 1600V 5%
C108	34115-2244	MPE 0.22uF 50V 5%
! C109	31115-4732	PE 0.047uF 50V 5%
! C110	34115-2244	MPE 0.22uF 50V 5%
C111	28H67-2291	EL 2.2uF 50V 20%
C112	28637-1021	EL 1000uF 16V 20%
C113	28637-3311	EL 330uF 16V 20%
C114	28647-3311	EL 330uF 25V 20%
C115	28647-3311	EL 330uF 25V 20%
C116	28H57-4711	EL 470uF 35V 20%
C117	28H57-4711	EL 470uF 35V 20%
C118	281B8-1011	EL 100uF 250V 50%/-10%
C119	28807-1011	EL 100uF 160V 20%(PR)
C120	28807-1011	EL 100uF 160V 20%(PR)
C121	39147-1027	CE 1000pF 50V 20%
! C122	39147-1227	CE 1200pF 50V 20%
C124	31115-2232	PE 0.022uF 50V 5%
C125	39447-4717	CE 470pF 500V 20%
C127	28108-2291	EL 2.2uF 160V 50%/-10%
C128	28807-1011	EL 100uF 160V 20%(PR)
C129	39147-1027	CE 1000pF 50V 20%
C130	31115-6832	PE 0.068uF 50V 5%
C131	35145-2246	MPP 0.22uF 250V 5%
C132	281B8-2291	EL 2.2uF 250V 50%/-10%
C201	28H37-4701	EL 47uF 16V 20%
C202	28H37-1001	EL 10uF 16V 20%
C203	34115-1044	MPE 0.1uF 50V 5%
C204	31115-5622	PE 5600pF 50V 5%
C206	28H37-1011	EL 100uF 16V 20%
C207	31115-3322	PE 3300pF 50V 5%
C208	29176-1091	TA 1uF 35V 10%
C209	28H57-2221	EL 2200uF 35V 20%
C210	28H57-1011	EL 100uF 35V 20%
C211	39447-1007	CE 10pF 500V 20%
C212	28H67-1091	EL 1uF 50V 20%
C213	28H57-2221	EL 2200uF 35V 20%
C214	28H47-1011	EL 100uF 25V 20%
C215	28H67-1091	EL 1uF 50V 20%
C216	28437-2201	EL 22uF 16V 20%
C217	31115-1042	PE 0.1uF 50V 5%

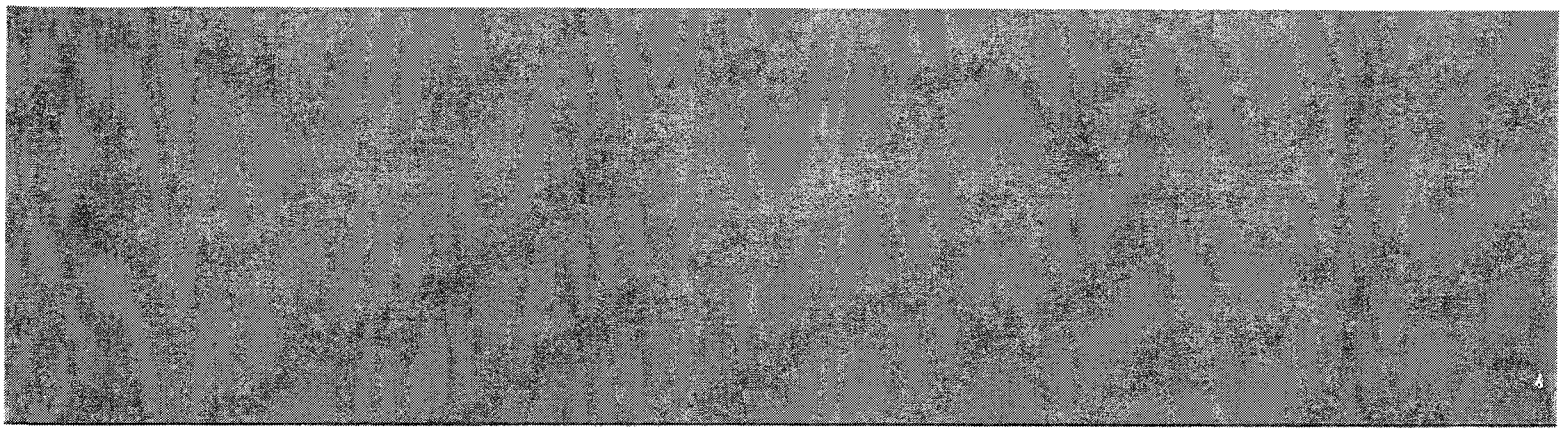
SYMBOL NO.	PART NO.	DESCRIPTION
C218	29176-6881	TA 0.68uF 35V 10%
C219	39187-1037	CE 0.01uF 50V 20%
C220	28H37-1011	EL 100uF 16V 20%
C221	39447-2227	CE 2200pF 500V 20%
C222	39447-2227	CE 2200pF 500V 20%
C223	39447-2227	CE 2200pF 500V 20%
C224	39447-1027	CE 1000pF 500V 20%
C225	39447-1027	CE 1000pF 500V 20%
C226	39447-1027	CE 1000pF 500V 20%
C227	39B87C1047	CE 0.1uF 50V 20%
C228	39B87C1047	CE 0.1uF 50V 20%
C229	28H37-1011	EL 100uF 16V 20%
C230	39447-3317	CE 330pF 500V 20%
C231	39487-1038	CE 0.01uF 500V 20%
C232	28H47-2201	EL 22uF 25V 20%
C233	39B87C1047	CE 0.1uF 50V 20%
C234	28H67-3391	EL 3.3uF 50V 20%
C235	31115-1042	PE 0.1uF 50V 5%
C236	39146-4717	CE 470pF 50V 10%
! C301	39447-1017	CE 100pF 500V 20%
C302	32115-2223	PE 2200pF 50V 5%
C303	39147-2717	CE 270pF 50V 20%
C304	32115-6823	PE 6800pF 50V 5%
C305	28H67-1091	EL 1uF 50V 20%
C306	32115-2223	PE 2200pF 50V 5%
C307	28H67-1091	EL 1uF 50V 20%
C308	33122-3324	PP 3300pF 100V 2%
C309	39147-1027	CE 1000pF 50V 20%
C310	39447-5617	CE 560pF 500V 20%
! C311	39487-1038	CE 0.01uF 500V 20%
C312	39447-1027	CE 1000pF 500V 20%
C313		CRT dependent parts
! C314	351A5-2527	MPP 2500pF 1600V 20%
! C315	33155-1534	PP 0.015uF 400V 5%
C316	28808-1011	EL 100uF 160V 20%
C317	33145-2234	PP 0.022uF 250V 5%
! C318	281A8-1001	EL 10uF 200V 50%/10%
C319	39187-1037	CE 0.01uF 50V 20%
C320	39447-5617	CE 560pF 500V 20%
C321	39447-3317	CE 330pF 500V 20%
C322		CRT dependent parts
! C324	39447-3317	CE 330pF 500V 20%
C325	33125-1046	PP 0.1uF 100V 5%
C326	31115-1522	PE 1500pF 50V 5%

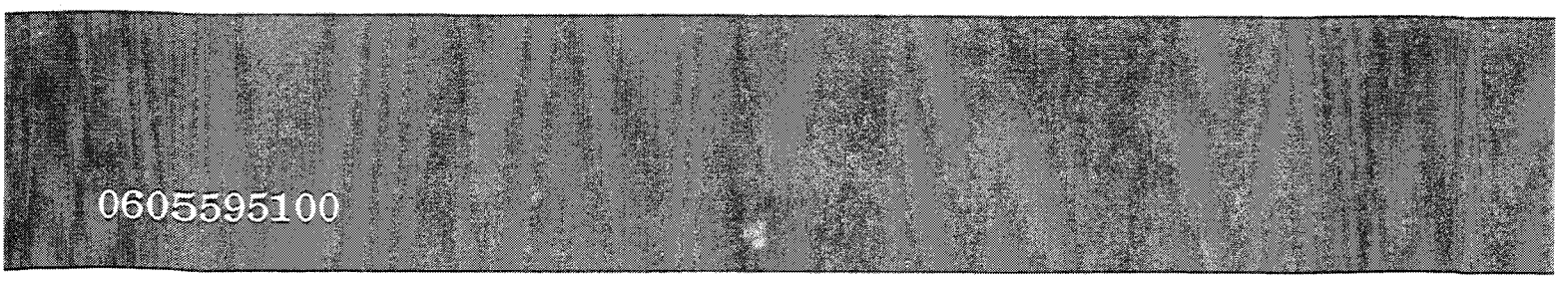
SYMBOL NO	PART NO.	DESCRIPTION
C327	29176-2291	TA 2.2uF 35V 10%
C328	28H47-4701	EL 47uF 25V 20%
! C329	351A5-3027	MPP 3000pF 1KV 20%
! C330	35155-6449	MPP 0.64uF 400V 5%
! C331	35155-6449	MPP 0.64uF 400V 5%
C332	39187-1037	CE 0.01uF 50V 20%
C333	39187-1037	CE 0.01uF 50V 20%
C334	39187-1037	CE 0.01uF 50V 20%
C335	33122-2224	PP 2200pF 100V 2%
C336	39187-1037	CE 0.01uF 50V 20%
C337	39187-1037	CE 0.01uF 50V 20%
C338	28H47-2201	EL 22uF 25V 20%
C339	28H37-1011	EL 100uF 16V 20%
C340	39147-1017	CE 100pF 50V 20%
C341	39147-1027	CE 1000pF 50V 20%
C342	28H37-1011	EL 100uF 16V 20%
C343	28H57-4701	EL 47uF 35V 20%
C344	28H47-1001	EL 10uF 25V 20%
C345	28H47-2201	EL 22uF 25V 20%
C346	39187-1037	CE 0.01uF 50V 20%
C348	39B87C1047	CE 0.1uF 50V 20%
C349	28H47-1011	EL 100uF 25V 20%
C401	28H37-1011	EL 100uF 16V 20%
C402	28H37-1011	EL 100uF 16V 20%
C403	28H37-4701	EL 47uF 16V 20%
C404	28H37-4701	EL 47uF 16V 20%
C405	28H37-4701	EL 47uF 16V 20%
C406	39187-1037	CE 0.01uF 50V 20%
C407	39187-1037	CE 0.01uF 50V 20%
C408	28H37-2211	EL 220uF 16V 20%
C409	39147-2717	CE 270pF 50V 20%
C410	28H47-1011	EL 10uF 25V 20%
C411	28H47-1011	EL 10uF 25V 20%
C412	39187-1037	CE 0.01uF 50V 20%
C413	28H37-2211	EL 220uF 16V 20%
C415	39147-1027	CE 1000pF 50V 20%
C416	39B87C1047	CE 0.1uF 50V 20%
C417	28H67-1091	EL 1uF 50V 20%
C418	39B87C1047	CE 0.1uF 50V 20%
C419	39147-1527	CE 1500pF 50V 20%
C420	39147-1027	CE 1000pF 50V 20%
C421	39B87C1047	CE 0.1uF 50V 20%
C422	39B87C1047	CE 0.1uF 50V 20%
C423	39B87C1047	CE 0.1uF 50V 20%

SYMBOL NO.	PART NO.	DESCRIPTION
C424	28H37-4701	EL 47uF 16V 20%
C425	28H47-1001	EL 10uF 25V 20%
C426	39147-1207	CE 12pF 50V 20%
C427	39B87C1047	CE 0.1uF 50V 20%
C428	39B87C1047	CE 0.1uF 50V 20%
C429	39B87C1047	CE 0.1uF 50V 20%
C430	39B87C1047	CE 0.1uF 50V 20%
C432	28H47-1001	EL 10uF 25V 20%
C433	39187-2237	CE 0.022uF 50V 20%
C434	28H47-1001	EL 10uF 25V 20%
C438	39B87C1047	CE 0.1uF 50V 20%
C482	28H37-3311	EL 330uF 16V 20%
C483	39B87C1047	CE 0.1uF 50V 20%
C484	39B87C1047	CE 0.1uF 50V 20%
C493	28H37-4701	EL 47uF 16V 20%
C501	28437-4701	EL 47uF 16V 20%
C502	28437-4701	EL 47uF 16V 20%
C503	28437-4701	EL 47uF 16V 20%
C504	28H67-2291	EL 2.2uF 50V 20%
C505	28H67-2291	EL 2.2uF 50V 20%
C506	28H67-2291	EL 2.2uF 50V 20%
C510	39187-1037	CE 0.01uF 50V 20%
C511	39187-1037	CE 0.01uF 50V 20%
C512	39187-1037	CE 0.01uF 50V 20%
C514	39187-1037	CE 0.01uF 50V 20%
C515	39187-1037	CE 0.01uF 50V 20%
C516	28457-4791	EL 4.7uF 35V 20%
C521	28H37-4711	EL 470uF 16V 20%
C530	39B87C1047	CE 0.1uF 50V 20%
C601	35145-2246	MPP 0.22uF 250V 5%
C602	35145-2246	MPP 0.22uF 250V 5%
C603	35145-2246	MPP 0.22uF 250V 5%
C604	39146-3317	CE 330pF 50V 10%
C605	39146-3317	CE 330pF 50V 10%
C606	39146-3317	CE 330pF 50V 10%
C607	39B87C1047	CE 0.1uF 50V 20%
C608	39B87C1047	CE 0.1uF 50V 20%
C609	39B87C1047	CE 0.1uF 50V 20%
C610	39487-1038	CE 0.01uF 500V 20%
C611	39487-1038	CE 0.01uF 500V 20%
C612	39487-1038	CE 0.01uF 500V 20%
C613	28807-1091	EL 1uF 160V 20%
C614	28807-1091	EL 1uF 160V 20%
C615	28807-1091	EL 1uF 160V 20%

SYMBOL NO	PART NO.	DESCRIPTION
C619	28807-1001	EL 10uF 160V 20%
C620	39B87C1047	CE 0.1uF 50V 20%
C621	39447-2227	CE 2200pF 500V 20%
C622	39687-1038	CE 0.01uF 2KV 20%
C630	28838-1011	EL 100uF 16V 50%/-10%
C631	39487-1038	CE 0.01uF 500V 20%
	COILS	
L101	45M1K-4706	CHOKE 47uH
L102	45M1K-4706	CHOKE 47uH
! L104	46N00-0030	LINEAR 5mH
L301	45M1K-5606	CHOKE 56uH
L303	45B0K-279T	PEAKING 2.7uH
! L304	46L00-0200	H. LINEAR COIL
! L305	46W00-0110	H. WIDTH COIL
L401	45A0K-569C	PEAKING 5.6uH
L402	45A0K-569C	PEAKING 5.6uH
L403	45A0K-109C	PEAKING 1uH
L404	45A0K-109C	PEAKING 1uH
L405	45A0K-569C	PEAKING 5.6uH
L601	45A0K-689C	PEAKING 6.8uH
L602	45A0K-689C	PEAKING 6.8uH
L603	45A0K-689C	PEAKING 6.8uH
L604	45A0K-569C	PEAKING 5.6uH
L605	45A0K-569C	PEAKING 5.6uH
L606	45A0K-569C	PEAKING 5.6uH
	TRANSFORMERS	
! T101	47E00-0020	XFMR EMI
! T102	47S00-0260	XFMR SPS
! T103	47D10-0010	XFMR DRI
! T301	47D10-0010	XFMR DRI
! T302	47P10-0050	XFMR PINCUSHION
! T303	47F13-0161	XFMR (FBT)
	ASSEMBLY PARTS	
!	46G00-0050	COIL DEGAUSSING
! F101	49F52-252B	FUSE SLOW 2.5A 250V
SW1	52A42-0050	SWITCH SLIDE
SW2	52A42-0050	SWITCH SLIDE
SW3	52D22-0010	SWITCH DIP

SYMBOL NO.	PART NO.	DESCRIPTION
SW4	52A12-0020	SWITCH SLIDE
SW401	52L05-0020	SWITCH
! SW101	52P22-0080	POWER SWITCH
!	56C63W1803	POWER CORD (UL/CSA)
		125V 10A 105^{0}
!	64P40-0030	SOCKET POWER
CN401	64A09-0011	D-SUB 9PIN TO 15PIN
	65S01-1415	SIGNAL CABLE (9D-9D)
	65S11-1417	SIGNAL CABLE (15D-9D)
	MISCELLANEOUS	
D104	15B40T6021	DIODE SHOKTTY SB340
! BD101	15D67-4012	BRIDGE RS205
FD401	16E11-002S	DIODE ARRAY 1N4148X9
FD402	16E11-001T	DIODE ARRAY 1N4148X9
FD403	16E07-001S	DIODE ARRAY 1N4148X6
RP401	16K07-001Z	RES ARRAY 470 ohm
IC401	16M20-301R	IC PROM 82S147A
LED701	19A02-0020	3_{mm} (GREEN)
LED702	19A02-0020	3_{mm} (GREEN)
LED801	19A02-0010	POWER (GREEN)
! PR101	26A00-0010	PTCR
SG601	42S00-0040	SPARK GAP
SG602	42S00-0040	SPARK GAP
SG603	42S00-0040	SPARK GAP
! VR218	52R13-0020	VR 200KB
	DEPENDENT PARTS FOR 0.29_{mm} CRT	
! CRT	20H14-0461	M34ECL12X36 (0.29_{mm})
! C313	351A5-3027	MPP 3000pF 1600V 20%
! C322	35155-5649	MPP 0.56uF 400V 5%
	DEPENDENT PARTS FOR 0.28_{mm} CRT	
! CRT	20H14-1160	M34KBV80X50 (0.28_{mm})
!	20H14-1560	E8252B22-TC02ETHT(0.28_{mm})
! C313	351A5-2527	MPP 2500pF 1600V 20%
! C322	35155-474A	MPP 0.47uF 400V 5%

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